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CREATING AN INDUSTRY

DOEHLER DIE-CASTING CO.

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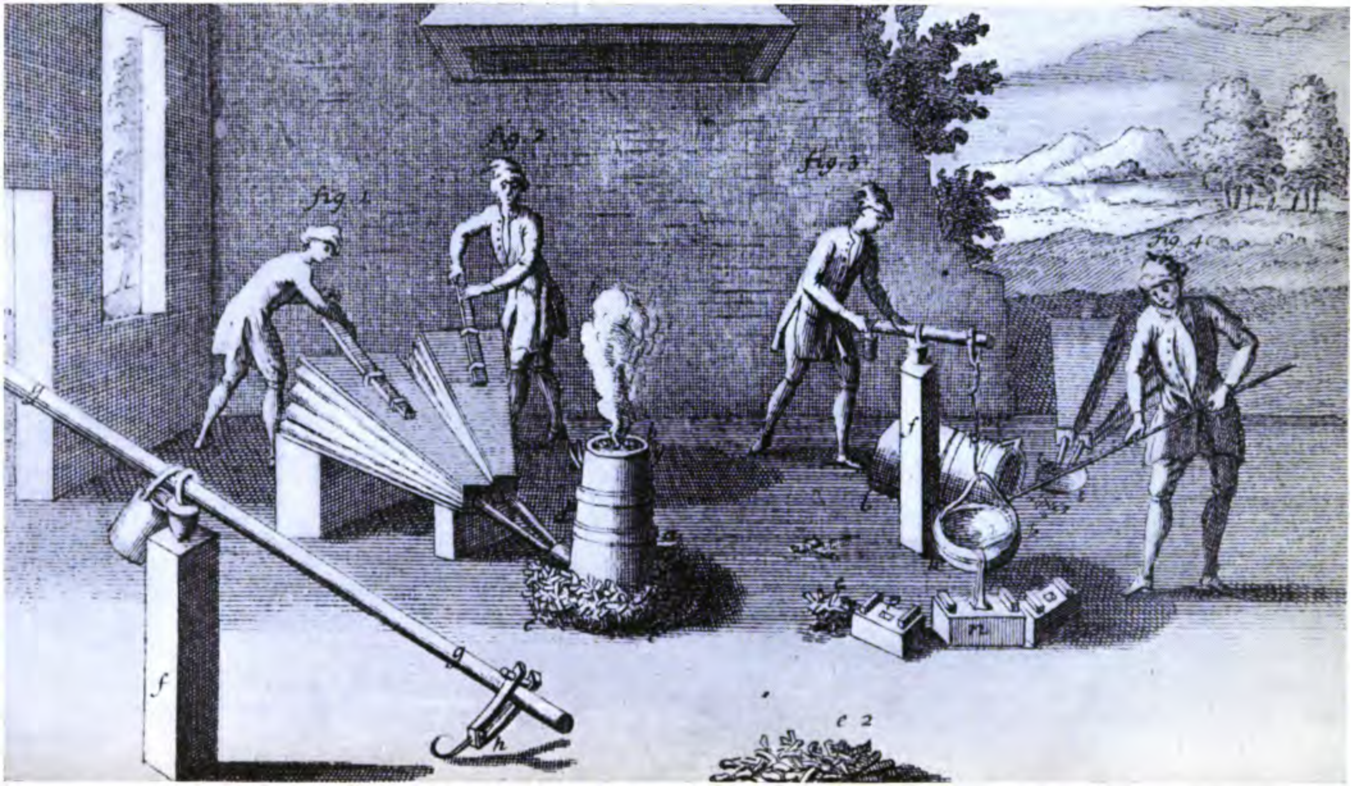

Typical Foundry about 1724

UNIV. OF MICH.

CREATING AN INDUSTRY

DOEHLER DIE-CASTING CO.
BROOKLYN, N. Y.
TOLEDO, OHIO
NEWARK, N. J.

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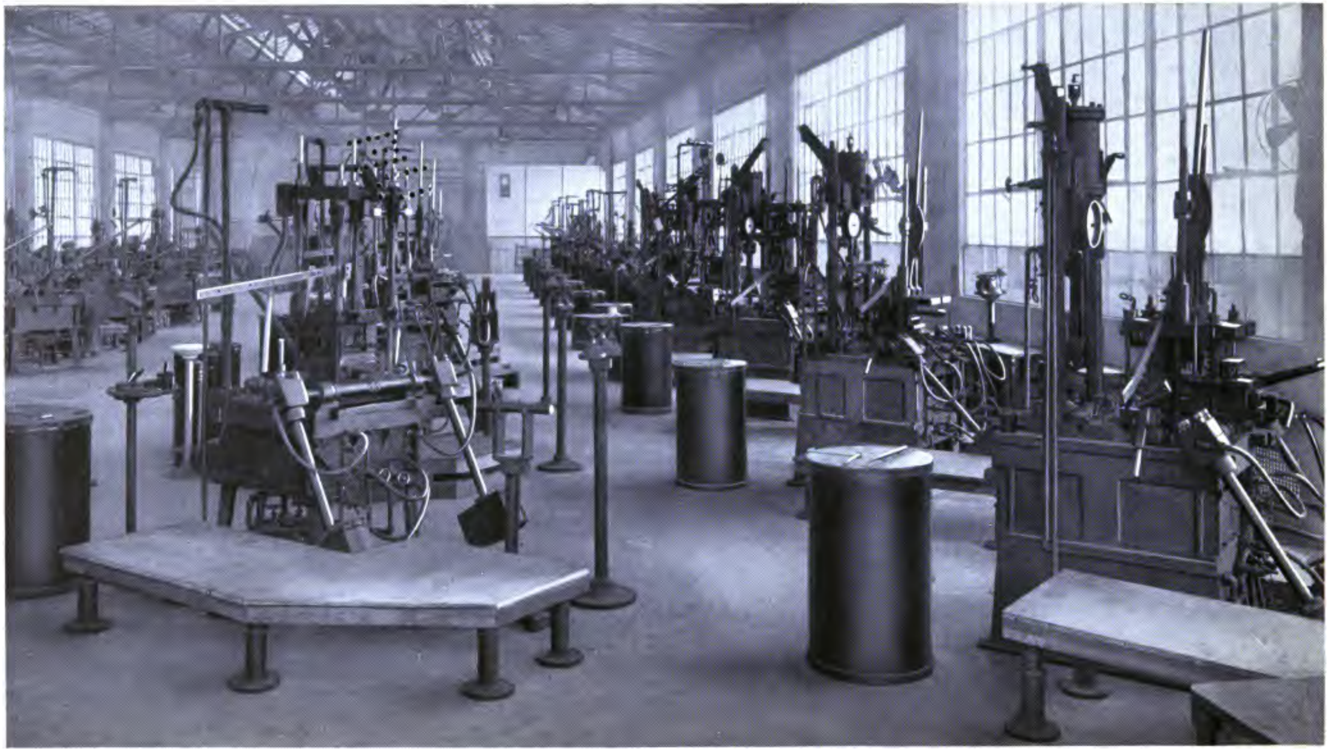


One of our
Casting Rooms
1916

East Eng.
GIFT
MRS. PATTERSON
12-4-1931

PREHISTORIC TO MODERN TIMES

THE art of casting metals into previously prepared moulds has been known and practised since prehistoric times. We find the casting of metals referred to in many passages of the Bible. The casting of the golden calf by Aaron is probably the most prominent and best remembered. His work is described in the following words (Exodus, Chapter XXXII): "And all the people brake off the golden earrings which were in their ears, and brought them unto Aaron. And he received them at their hand, and fashioned it with a graving tool, after he had made it a molten calf."

We also find that King Solomon's throne was adorned with two huge bronze lions and in many other instances there appear references to the casting of metals in Biblical times. The value of these statements in scientific research has been questioned, but there are many facts that point to their probability.

Although the Egyptians practised the art of metal casting long before any other nation, the Greeks were undoubtedly the most skillful in this art during the ten centuries immediately preceding the beginning of the Christian Era. One of the seven wonders of the world is the bronze statue of the Sun God Helois in Rhodes, commonly known as The Colossus of Rhodes, made by a Greek named Chares, during the reign of Demetrius in the fourth century before Christ. This work occupied him for twelve years, and when finished stood 105 feet high, weighing 360 tons. It was destroyed by an earthquake in 224 B. C. Other Greek

Egyptian Casting Operation
1500 B.C.

Ancient Greek Furnace
(from a vase)

Stone Moulds from Ancient
Troy, for casting swords

Stone and Baked Clay Open
and Closed Moulds from
the Lake Dwellings
1000–1500 B.C.

colossi such as the Apollo of Calamis, the Zeus and Hercules of Lysippus and Zeus at Olympia are amongst the most remarkable castings of any age. In 479 B. C., a bronze pillar was set up by the Greeks to commemorate their victories. It was about 20 feet high, cast in one piece, hollow, with the names of the states engraved on it.

Metals and Alloys

The question as to the priority of certain metals or alloys in history has created an extensive discussion amongst archaeologists throughout the world. According to the accepted theory, the first three stages from barbarism to civilization are clearly defined by the relics of stone, bronze and iron. It is then assumed that bronze was used before iron.

From a purely metallurgical standpoint and without entering into an extended archaeological discussion, it would appear that amongst the useful metals, iron was probably known first and used for hammering into implements of war, since iron was to be found in its native state in the form of meteorites. Copper was probably known next since this element was also found to a large extent in its native form and required no smelting operation. Bronze (by which is meant copper-tin alloys) was probably next used since "tin-stone" was so abundant in Cornwall. Brass (by which is meant copper-zinc alloys) was probably the last to be used—many historical facts tending to prove this classification.

Melting Furnaces

The early Egyptian type of furnace (shown in accompanying photographs) was made by digging a hole in the ground and setting the crucible into it with a surrounding layer of fuel. A draught was created in the earlier types of furnaces by fanning with bamboo matting, although in the later types of furnaces a bellows appears to have been used which was worked by foot power, two men being required to operate each bellows. This furnace undoubtedly forms the basis of the pit furnace used so extensively in modern foundry practise.

The Greek furnace (see illustration) appears to have been built along the lines of the modern cupola furnace. This served as an annealing, forging, and preheating, as well as a melting furnace.

During the Middle or Dark Ages very little progress was made in furnace construction, but we find the reverberatory furnace in use to a large extent as early as the fifteenth century.

In tracing the evolution of the metal casting art, we find the composition of the moulds used at the

Mediaeval Japanese Foundry
(From Smithsonian Institute)

Type Casting about 1568

Type Casting about 1683

Casting in Clay about 1718

Foundry Equipment
about 1724

Type Casting Utensils
of 1740

Casting Pewter, 1755

Type Casting, 1800

various stages to be of more than passing interest. A whole series of moulds belonging to the first Dynasty of Egypt (about 2400 B. C.) has been unearthed. They show that the moulds were carved in thick pieces of clay, baked into pottery, and lined with a fine ashy clay. In the lake dwellings of Switzerland various moulds have been found which date from 1000 to 2000 B. C. Some are of rock, others of clay. Rock seemed to be preferred for the flatter objects, clay for the more complicated. Whether the first moulds were of stone or baked clay is uncertain, since stone and clay are more closely related to the pottery art, which is far older than recorded history and was known and practised long before the metal casting art.

Moulds

Both rock and clay moulds, or at least some of them, were constructed in halves or in even more parts, so that they could be preserved. Holes for plugs are to be seen which were used in fitting the parts of the moulds together. Moulds found in ancient Troy likewise show the use of both stone and baked clay, some of them being constructed in symmetrical halves.

Moulding in sand commercially, began about 1708. At that time, Abraham Darby, in Wales, had been having considerable trouble in the casting of hollow iron vessels, when an apprentice by the name of John Thomas conceived the idea that by using sand instead of clay, the air would be more easily released from the casting thus producing a better casting and avoid the destruction of many moulds. After experimenting for some time, most of which was carried on after their regular working hours, they were finally successful in perfecting the idea, and the present-day method of sand casting was thus originated.

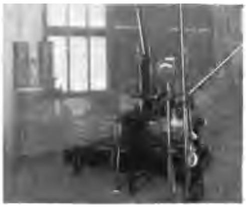
In England a patent for sand moulding was allowed by the government in 1758, although it appears from one of the accompanying photographs that Rauemer used sand for moulding and his furnaces as well as his other equipment were not unlike those in use in modern foundries.

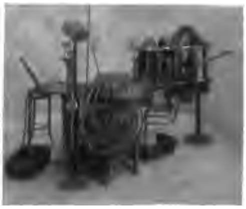
Metallic Moulds

The first appearance of the metal mould seems to have come with the advent of printing in 1454. The demand for cheap type led to improvements along this line, which resulted in the evolution of the modern linotype machine.

During the seventeenth and eighteenth centuries metal moulds began to be used for casting pewter tableware which was greatly in vogue during that period. During the nineteenth century metal

Our Original Hand-operated Die-Casting Machine


Improved Hand-operated Die-Casting Machine


Our Gravity Die-Casting Machine

Our Latest Automatic Die-Casting Machine

Battery of our Gravity Machines

Battery of our Automatic Machines

Battery of Compressed Air Machines

Parts of a "Doehler" Die

moulds also came into use for the production of hollow lead toys, clock frames, etc., which were produced by the so called "slush" process.

The avalanche of motor propelled vehicles which marked the beginning of the twentieth century, together with the evolution of many automatic vending, printing, and talking machines, created a demand for a simpler and cheaper method for producing accurate castings than the old-fashioned sand process. The metallic mould seemed to be the only solution to this problem and many years of labor and experiment were spent in an attempt to establish this process on a commercial basis.

In 1906, H. H. Doehler perfected and in 1907 patented his die-casting process and placed so called die-castings made from alloys of zinc, tin and lead on the market. These castings were smooth and accurate, requiring little or no machining. From this obscure beginning the process developed rapidly. Metal mixtures or alloys with a strict regard to metallurgical principles were gradually evolved. New and improved casting machines were devised, scientific casting methods were adopted; and the die-casting industry has become one of the largest and most important branches of the non-ferrous metal trades.

THE
LAST DECADE

To record the progress of the die-casting industry within the last decade is to relate the achievements of the Doehler Die-Casting Co.

Ten years ago our working force consisted of twenty men and our output that year amounted to about $20,000. Today, we operate four individual plants, employing over one thousand men and our annual output exceeds $4,000,000.

Such results are not accidental, but effects of distinct causes, the foremost of which is our development of the die-casting alloys.

Alloys

From unreliable and haphazard metal-mixtures, we have developed through a labyrinth of scientific experiments and research work, a series of white metal alloys consisting of tin, lead and zinc alloys. These alloys are metals, properly proportioned, for distinctive functions, their uses being carefully studied by our force of chemists before being applied, and varied accordingly.

A table enumerating the basic alloys will be found on succeeding pages.

The next important developments are those in our casting machines. From a small, crude, hand-operated machine, we

Casting Machines

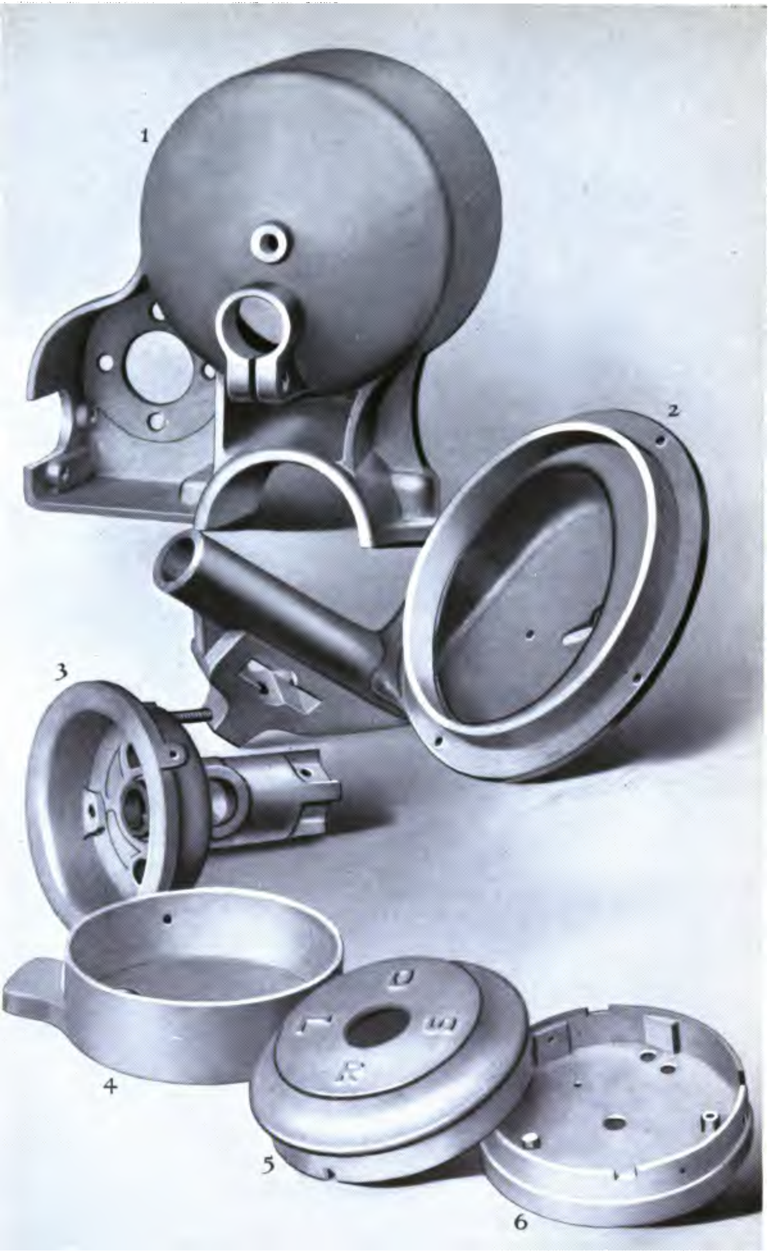
gradually evolved a powerful and rapid-acting automatic machine. The results from this development being lower priced and better castings — lower priced owing to the saving in labor from the faster operation through the automatic feature and better castings made possible by the uniformity of operations on this automatic machine as compared with the original hand-operated one.

A battery of these machines is illustrated.

The process in general has been advanced by us from die-casting small, simple pieces limited as to size, weight and

Process in General

character, to castings of any size and weight within practical limits and to the most complicated and intricate form, as the accompanying illustrations will prove.



1. Automobile Control Housing

2. Automobile Rear Signal Part

3. Automobile Ignition Frame

4, 5, 6. Automobile Rear Signal Parts

One of our latest achievements is that of die-casting aluminum alloys—successfully and commercially. This was accomplished after years of patient and tireless effort, and has already developed into a business of immense proportions.

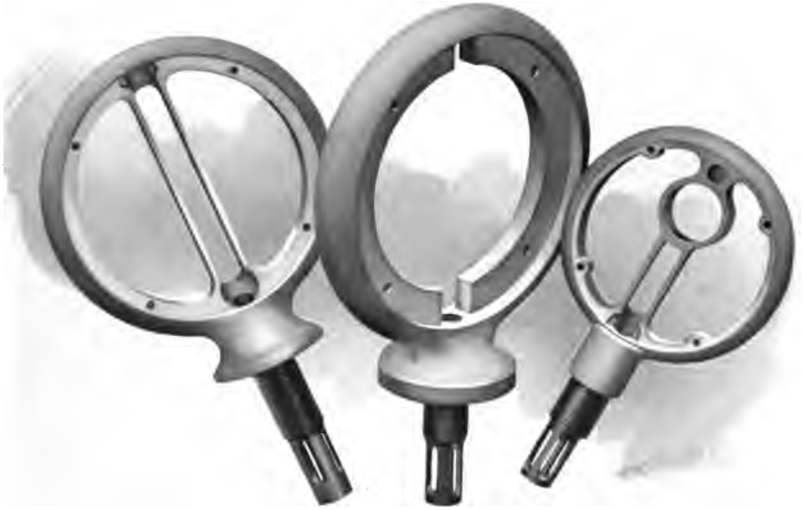
Aluminum Die-Castings

For this branch of our business we have adopted an aluminum-copper alloy (see table of alloys), having, after due research, become firmly convinced that this is the most practical of all aluminum alloys, and its extensive use amply demonstrates its reliability. Through the quick chilling which is entailed by our process, the strength of the casting from this alloy is greatly increased.

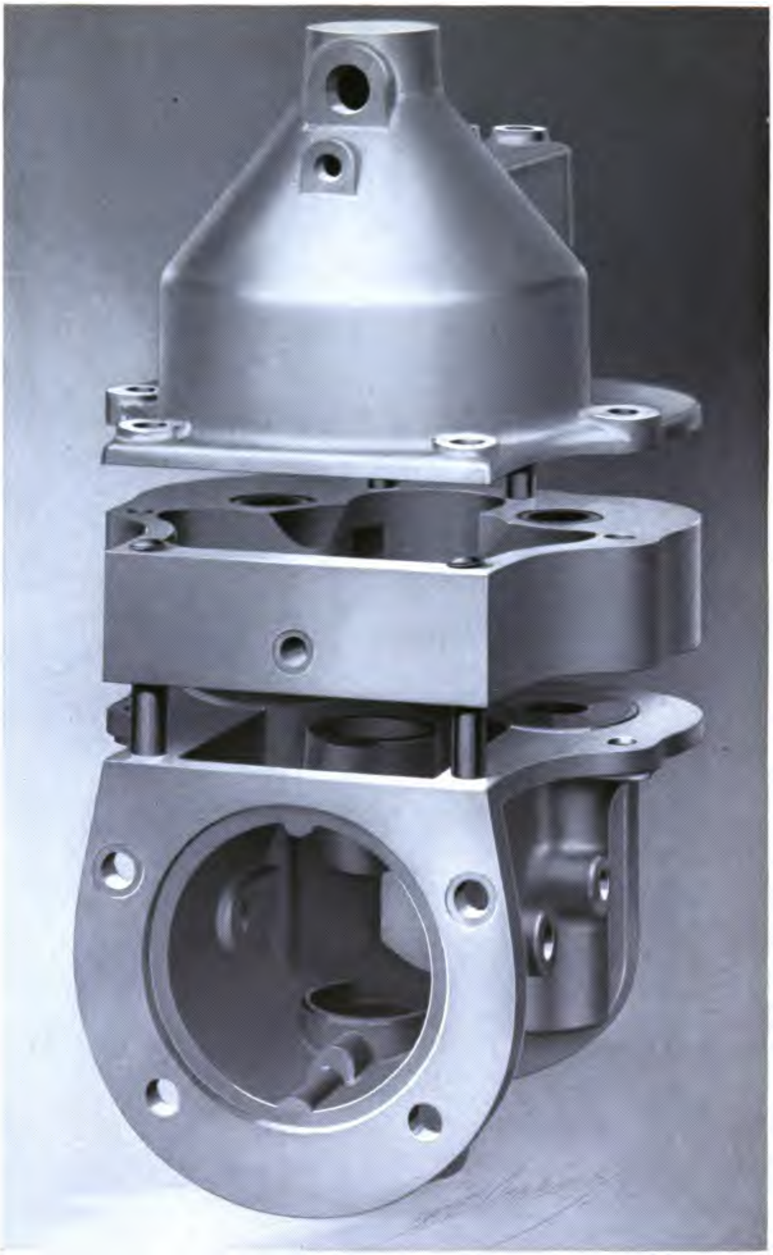
The accompanying illustrations clearly indicate the sharp outlines and excellent finish of these castings and ably demonstrate the wonderful possibilities of this process.

Accomplishments such as these can be effected only by an organization working in complete harmony, aiming towards one common goal—Success. To such an organization which it has succeeded in perfecting, and to the hearty co-operation of its individual members, the Doehler Die-Casting Co. owes its entire success *technically, commercially and financially*.

Organization



"Motometer" Frames



AUTOMOBILE ENGINE GOVERNOR PARTS

TABLE OF ALLOYS

The following are our basic alloys which can be varied in tensile strength, elongation and reduction of area to suit the requirements of a specific part:

No. 3 Alloy—Zinc Base

COMPOSITION (APPROXIMATE):

Zinc	88
Tin	8
Copper	4

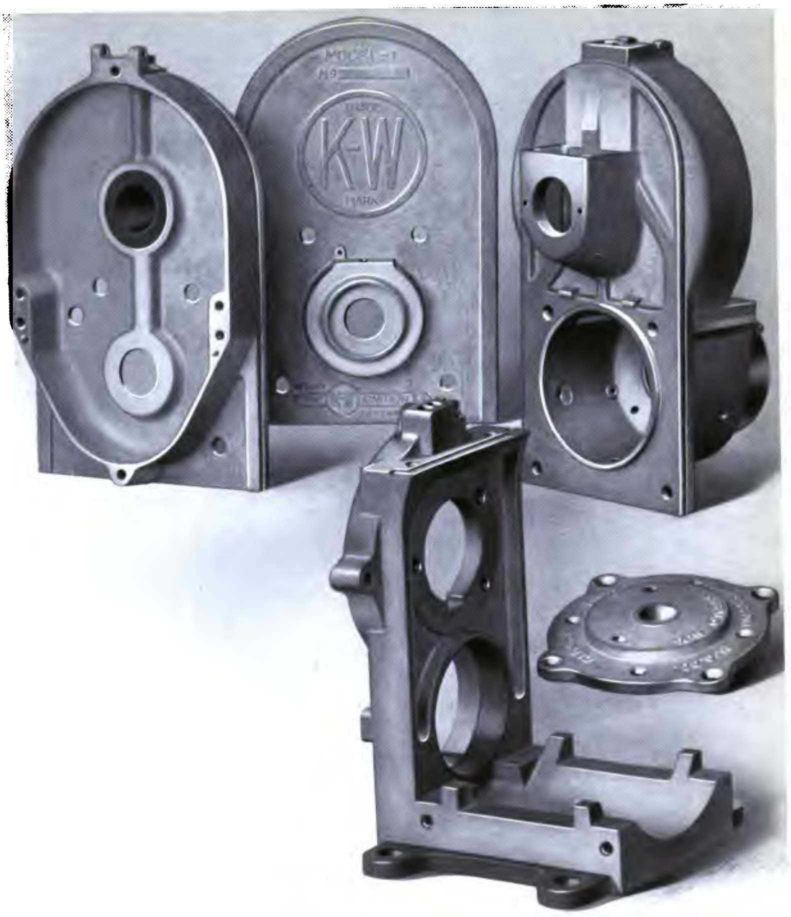
PHYSICAL PROPERTIES:

Specific Gravity	7.20
Weight per cubic inch	.253

The strength of this alloy may be compared favorably with cast iron, although non-magnetic, will take a high polish but will not hold it unless lacquered. Can be electroplated readily by the standard electroplating methods. Castings made from this alloy may be cold enameled (with any of the celluloid base enamels) or hot enameled at a temperature not to exceed 275 degrees Fahrenheit. This alloy will withstand a temperature of 275 degrees Fahrenheit, but its use generally is not advisable under temperature conditions exceeding 120 degrees Fahrenheit.

CHEMICAL PROPERTIES:

The alloy is readily dissolved by the ordinary mineral acids and is also readily soluble in alkalis. Water, aqueous solutions and damp atmosphere will corrode this alloy unless protected by an absolutely homogeneous coating of some non-corrosive metal, such as nickel or a high-grade lacquer or enamel. We do not, however, recommend the use of an alloy of this type where continual contact with water or aqueous solutions is one of the requirements of the part.



MAGNETO FRAMES

No. 28 Alloy—Tin Base

COMPOSITION (APPROXIMATE):

Tin	86
Copper	6
Antimony	8

PHYSICAL PROPERTIES:

Specific Gravity . . .	7.40
Weight per cubic inch .	.266

This alloy may be termed a "Genuine Babbitt" and used extensively for high-class engine bearings, etc. The tensile strength is very low, but the alloy can be used for machine parts where resistance to corrosion is desired, and strength is not essential. The alloy is easily polished on a soft wheel and keeps a white lustrous finish under normal atmospheric conditions, may also be electroplated by the usual methods. The alloy will begin to fuse at a temperature of 425 degrees Fahrenheit and is the highest melting point, tin-base bearing metal that has thus far been produced.

CHEMICAL PROPERTIES:

Not attacked by organic acids and can therefore be used for food containers. Slowly corroded by mineral acids and alkalis but comparatively unaffected by water, neutral aqueous solutions and damp or warm climatic conditions.

Bearings and Ball-bearing Cages

No. 52 Alloy—Lead Base

COMPOSITION (APPROXIMATE):

Lead	83
Antimony	17

PHYSICAL PROPERTIES:

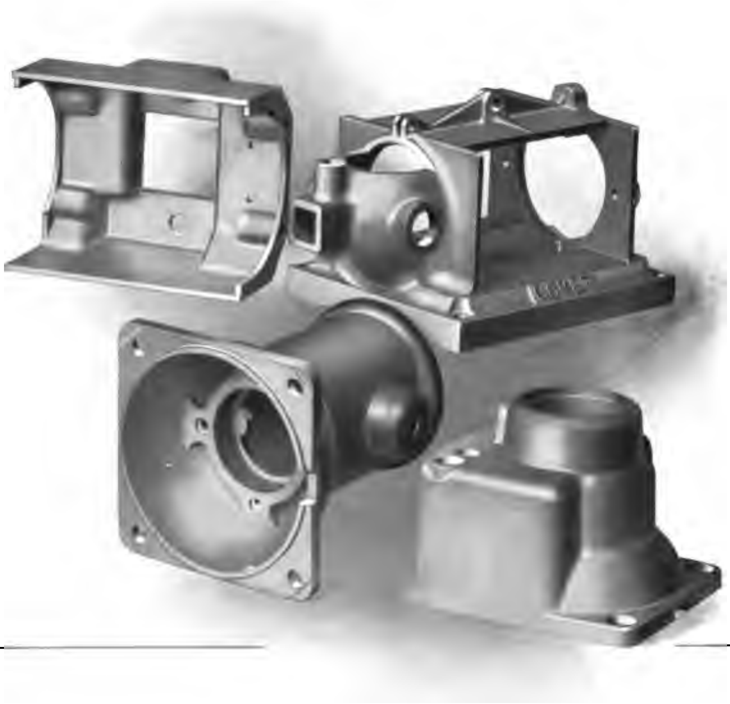
Specific Gravity	10.03
Weight per cubic inch	.382

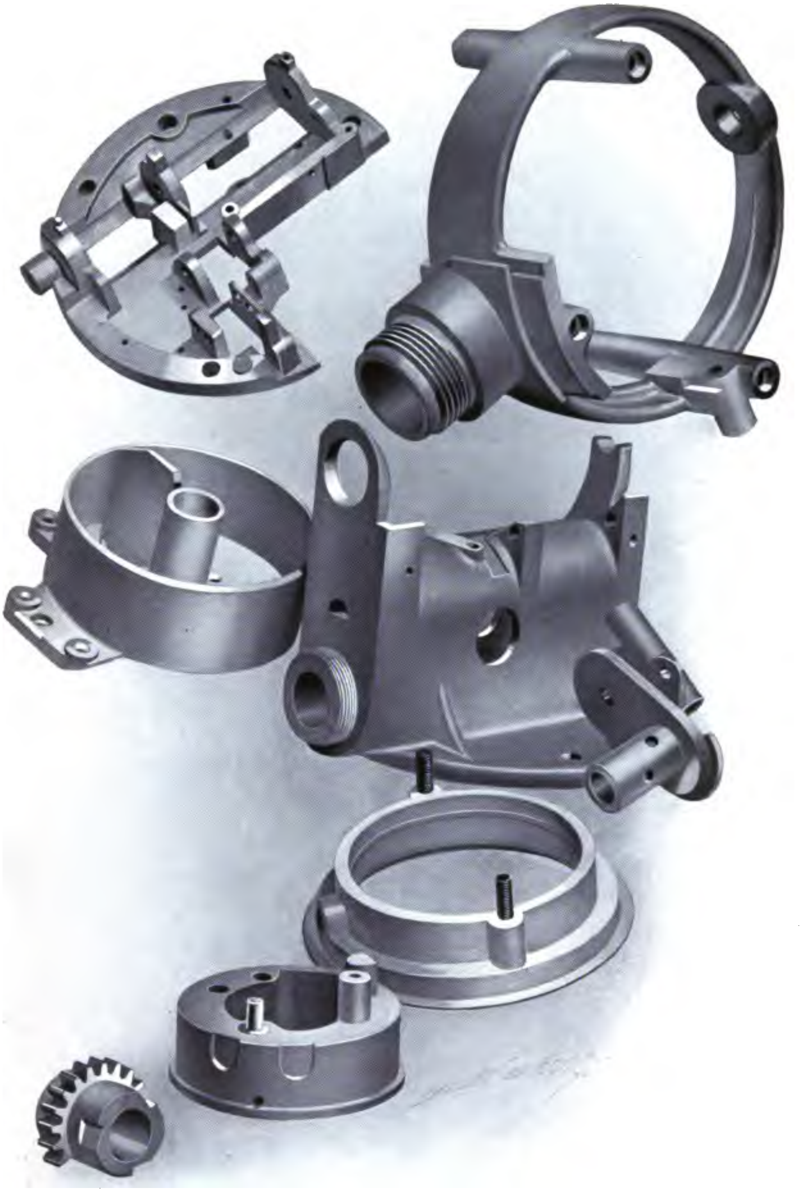
The physical properties may be varied to a large extent by variations in antimony contents and addition of other elements. Castings made from this alloy may be polished and nickelplated. Lead antimony alloys are amongst the finest bearing metals known where the speed and pressure are not excessive. Melting point, 600 degrees Fahrenheit.

CHEMICAL PROPERTIES:

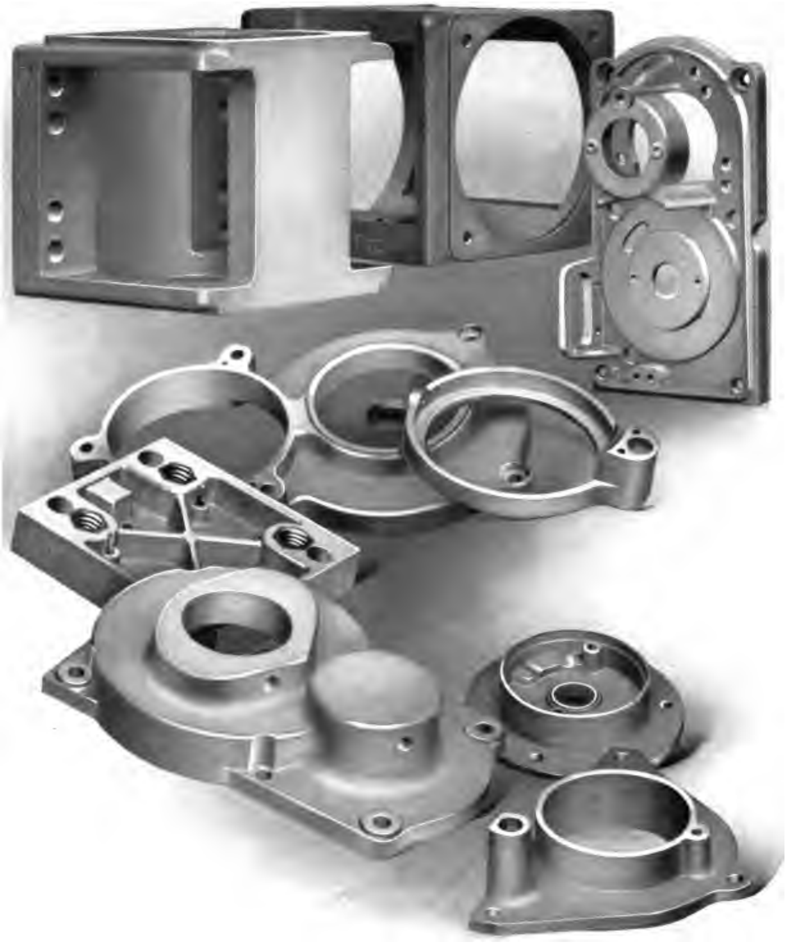
Insoluble in diluted sulphuric acid and is consequently well adapted for use in fire extinguishers, etc. Soluble in nitric acid and very slowly soluble in hydrochloric acid. Contact with organic acids forms basic lead salts which are poisonous. The alloy should consequently never be used for food containers.

Ignition and Lighting System Parts





SPEEDOMETER PARTS



MAGNETO PARTS

No. 12 Alloy—Aluminum Base

COMPOSITION (APPROXIMATE):

Aluminum	92
Copper	8

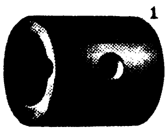
PHYSICAL PROPERTIES:

Specific Gravity . . .	3.003
Weight per cubic inch .	.114

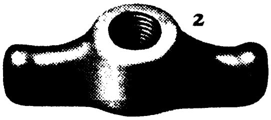
Tensile strength 21,500 pounds per square inch; elongation 1.5 per cent. By varying the copper contents of this alloy, the elongation and tensile strength may be varied to a great extent. This alloy will take a high polish and hold it without tarnishing for a long period. Many of our customers have satisfactorily nickel-, gold- and silver-plated this alloy in every-day practice, employing the usual methods with few slight modifications. The alloy fuses at 1150 degrees Fahrenheit.

CHEMICAL PROPERTIES:

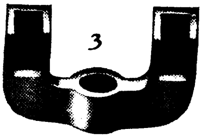
Readily soluble in alkali solutions. Insoluble in nitric acid. Readily soluble in diluted hydrochloric and sulphuric acids and soluble with difficulty in these acids when concentrated. Dietary organic acids have very little action on this alloy and when such action does take place the products are harmless, which makes this alloy well adapted for food containers, etc. Pure water has very little action on this alloy, although it is attacked slowly by salt water and water rich in carbonates and sulphates. The alloy is comparatively unaffected under normal atmospheric conditions.



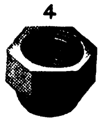
1. Bushing



2. Wing Nut



3. Phonograph Part



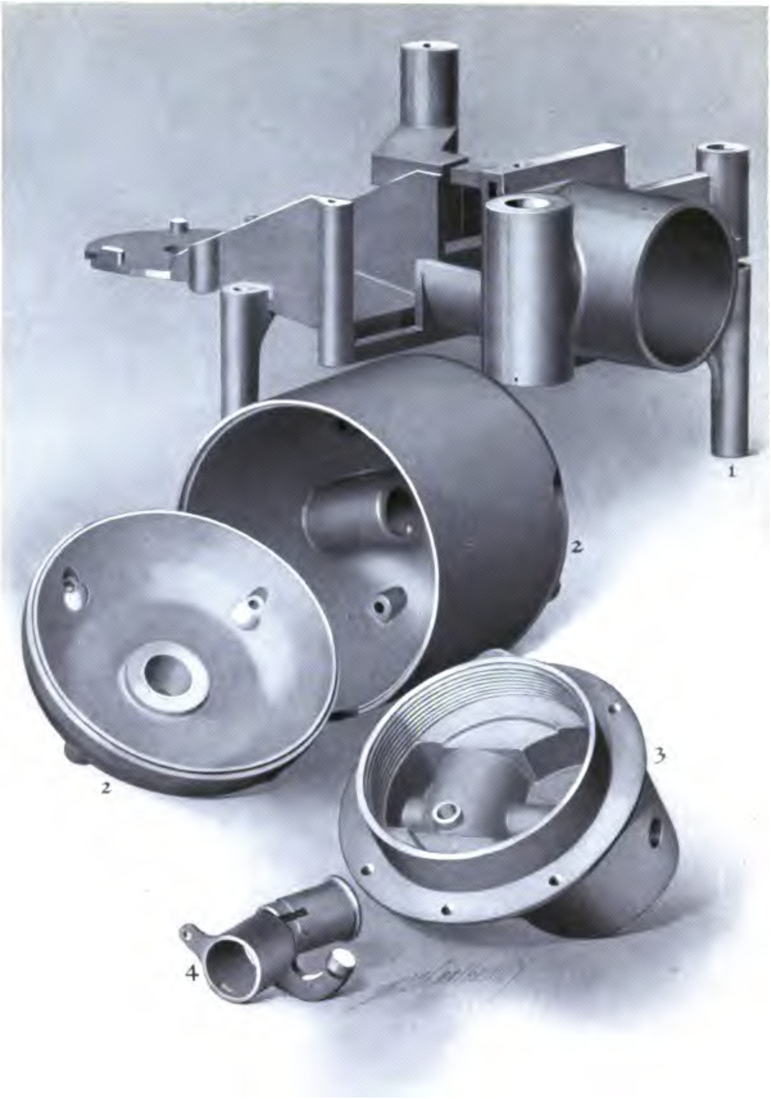
4. Acorn Nut

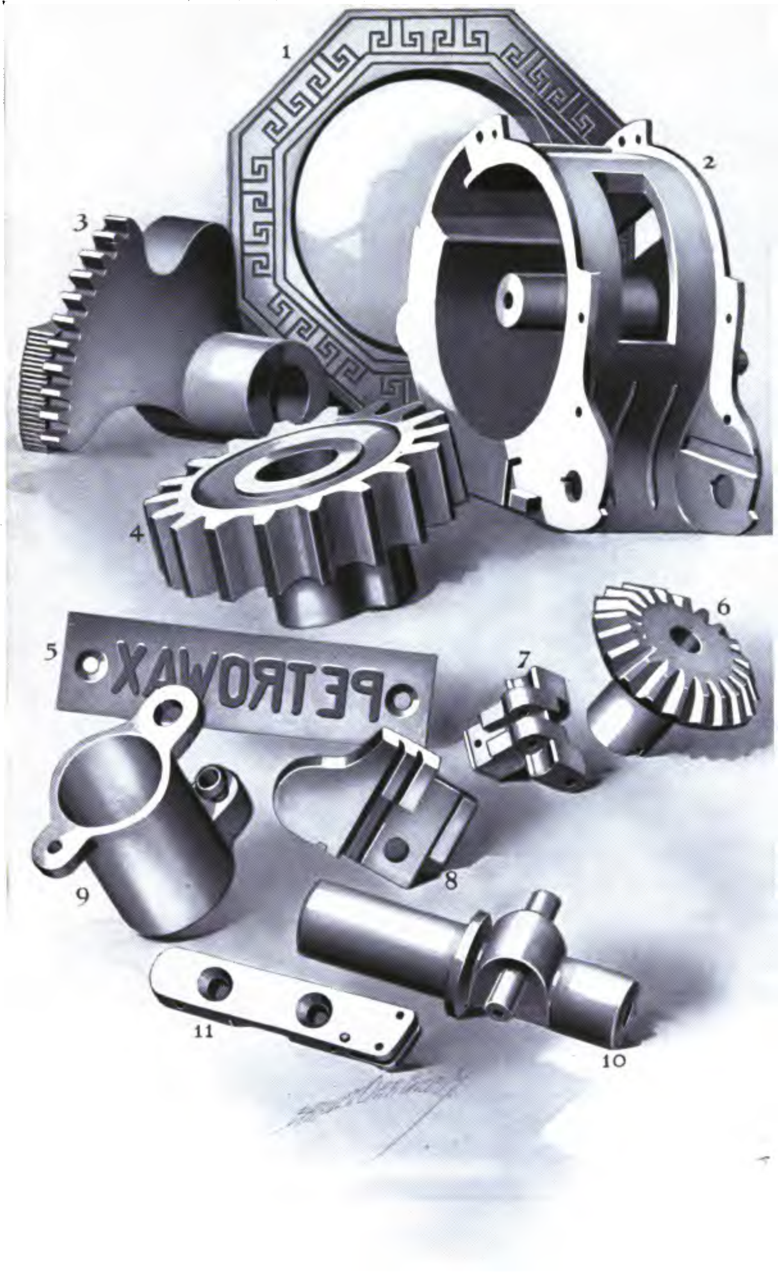
1. Automatic Photographing Machine Part

2. Motor Housing and Cover

3. Gauge Frame

4. Speedometer Parts





1. Clock Bezel
2. Stamp Affixer Part
3. Check Protector Part
4. Lithographing Machine Gear
5. Wax Mold
6. Bevel Gear
7. Chain Link
8. Loose Leaf Binder Parts
9. Testing Instrument Part
10. Engine Governor Adjusting Sleeve
11. Spinning Machine Guide

DIE-CASTING QUALITY

We believe the trade in general is thoroughly familiar with the product known under the trade name of Die-Castings. Rather, therefore, than go into a detailed description of the process of manufacture, which is already well known to all practical men in the various branches of the metal industry, we will devote this short review to the more important points of *Quality* in Die-Castings.

The fundamental factors bearing directly on die-castings, produced by forcing molten metal under pressure into a permanent metallic mould or die, are: *Strength*, *Accuracy*, *Uniformity*.

STRENGTH IS OBTAINED:

1st —By the proper designing of part to be die-cast.
2nd—By using only the best of raw materials in the alloys.
3rd —By alloying under the strict supervision of chemists.
4th —By protecting against segregation in the process of casting.
5th — By producing a casting that is closely grained.
6th —By eliminating casting defects.

All these points are carefully guarded by the various departments of our highly trained organization.

Our *Engineering Department* where all designing is executed, is composed of thoroughly trained technical men, with years of experience in the die-casting field. The correct construction of the part or the combination of several parts into one—the reinforcement on points of strain by the introduction of a steel or bronze bushing to take up the wear—and numerous other details to be considered for insuring the ultimate success of the casting to be produced are ably handled by this thoroughly competent force.

This department will gladly confer with the trade as to the designing of parts to be die-cast.

Our *Purchasing Department* by its inflexible rule to buy only the highest grade virgin metals obtainable—assures the use of none but the best of raw materials, and is the first step in guaranteeing against the entrance into the alloy of any ingredient that might possibly effect the ultimate strength of the casting.

Our *Laboratory* is the actual guardian of all metals during all the stages of operation they undergo. The force of chemists in our organization is divided into three groups—analytic, research, and shop chemists. They have direct supervision of the metals *before* alloying, *while being* alloyed, and *after* the alloy is produced. To the shop chemists is assigned the task of guarding the alloys on their route through the various operations; strictest rules for their handling and careful checking for accuracy at all stages being observed.

ACCURACY IS OBTAINED:

1st—By the proper calculation of shrinkages
2nd—By the accurate construction of die.
3rd—By temperature control of die as well as alloy.
4th—By a system of continuous checking by gauges or templets for the immediate detection of any inaccuracy.

Our *Die Designers* are expert in this particular branch and in no other part of this industry is expert experience as vital as in the designing of the dies. Our force of *die-makers*, *operators*, and *inspectors* are trained by many years of experience with our organization, men who have acquired their knowledge by careful study and untiring efforts.

Temperature control of die and alloy is automatic and is one of our latest achievements in the improvements made in the die-casting process.

UNIFORMITY IS OBTAINED:

1st—By absolute uniformity of alloys.
2nd—By temperature control.
3rd—By maintaining uniform conditions during the casting process.
4th—By weighing each casting for the immediate detection of any variation.
5th—By extreme care while in process of cleaning.

As uniformity makes for interchangeability of parts the points enumerated, insuring absolute uniformity, are rigidly adhered to.

With the aid of our *factory managers*, *superintendents* and *foremen*, we have within the last few years succeeded in installing an ever-increasing number of improvements for advancing the uniformity of Doehler Die-Castings.

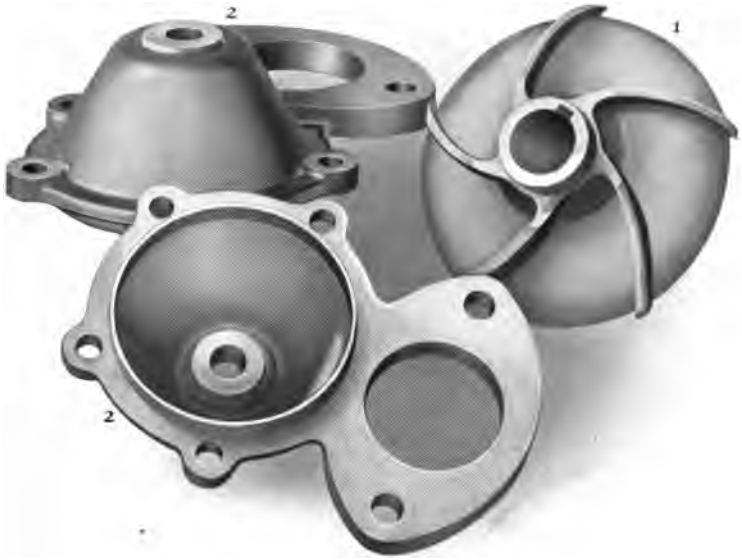
SANITARY DRINKING CUP DISPENSER PARTS

Heat recording devices in our metal mixing department, pyrometers with automatic heat-controlling devices attached, automatic casting machines with adjustments for regulating the pressure, thus assuring the delivery of correct pressure for varying classes of work; automatic stirring devices, improved method of conveying castings to protect them against injury; also an absolutely positive checking system.

We cannot emphasize too strongly the fact that die-castings of the strength, accuracy and uniformity of Doehler Die-Castings, are products of a highly trained and well-schooled organization. The peculiar nature of die-castings is such that the defects of an improperly designed and poorly made product may not be apparent at the outset, nor appear until the part, so made, is put to the use it was intended. It can therefore be readily seen how disastrous the consequences might prove of the employment of die-castings turned out by men lacking the experience and training to qualify them for the production of a sound and accurate casting.

We have had many cases under observation, where governed solely by price, die-castings were ordered from concerns possessing neither the training, personnel, nor organization required for their successful production. Such die-castings have invariably proven fatal to the device they were produced for, and in some cases the financial losses thereby entailed, have caused the commercial ruin of the purchaser.

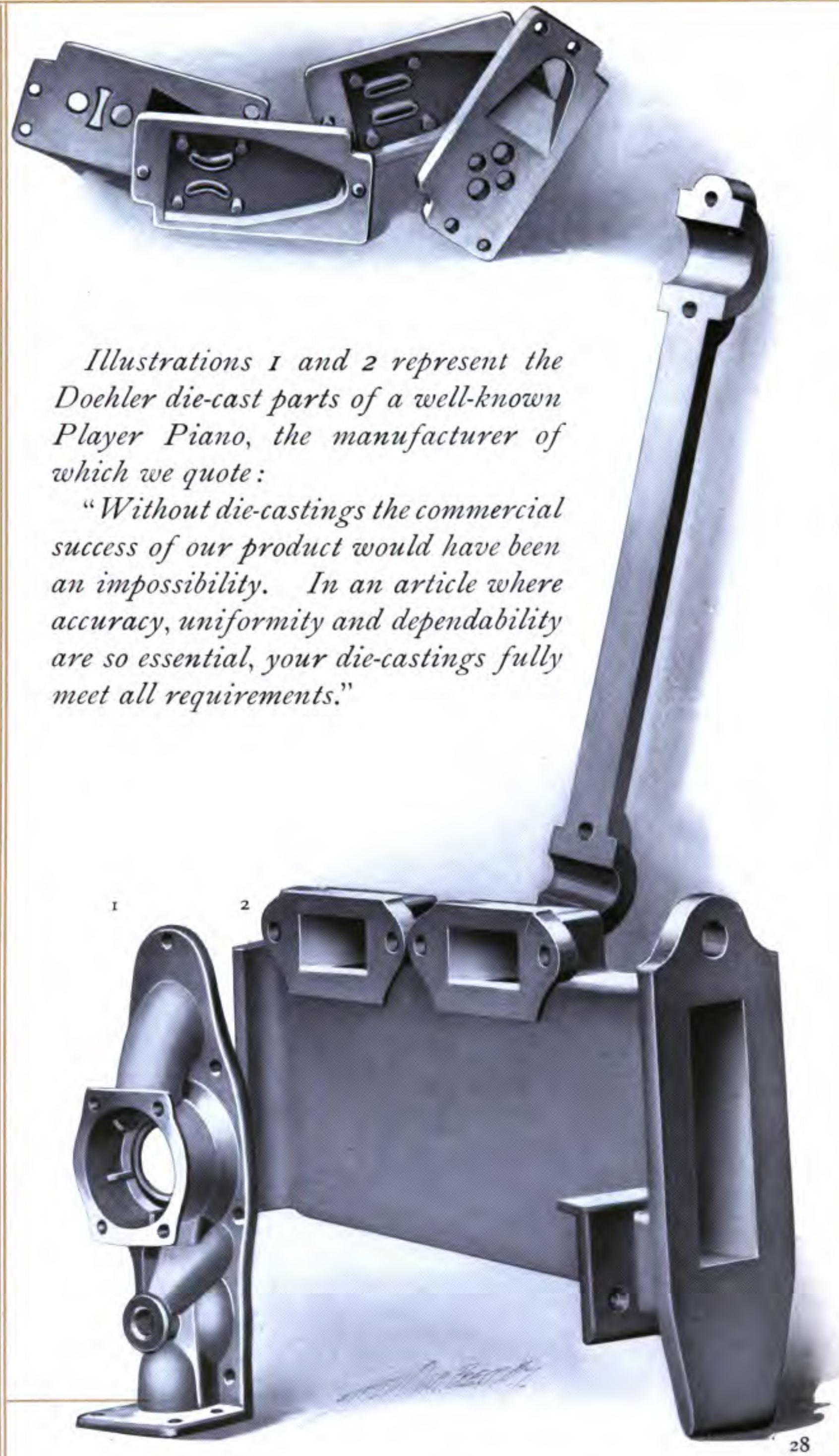
With such disastrous possibilities in mind, the necessity for absolute faith in and positive assurance of the reliability of die-castings will be realized. Such realization will reveal that undeviating quality, and unfailing service, backed by an organization of high integrity and sound financial responsibility are the causes for the phenomenal success of Doehler Die-Castings.



1. Water Pump Impeller

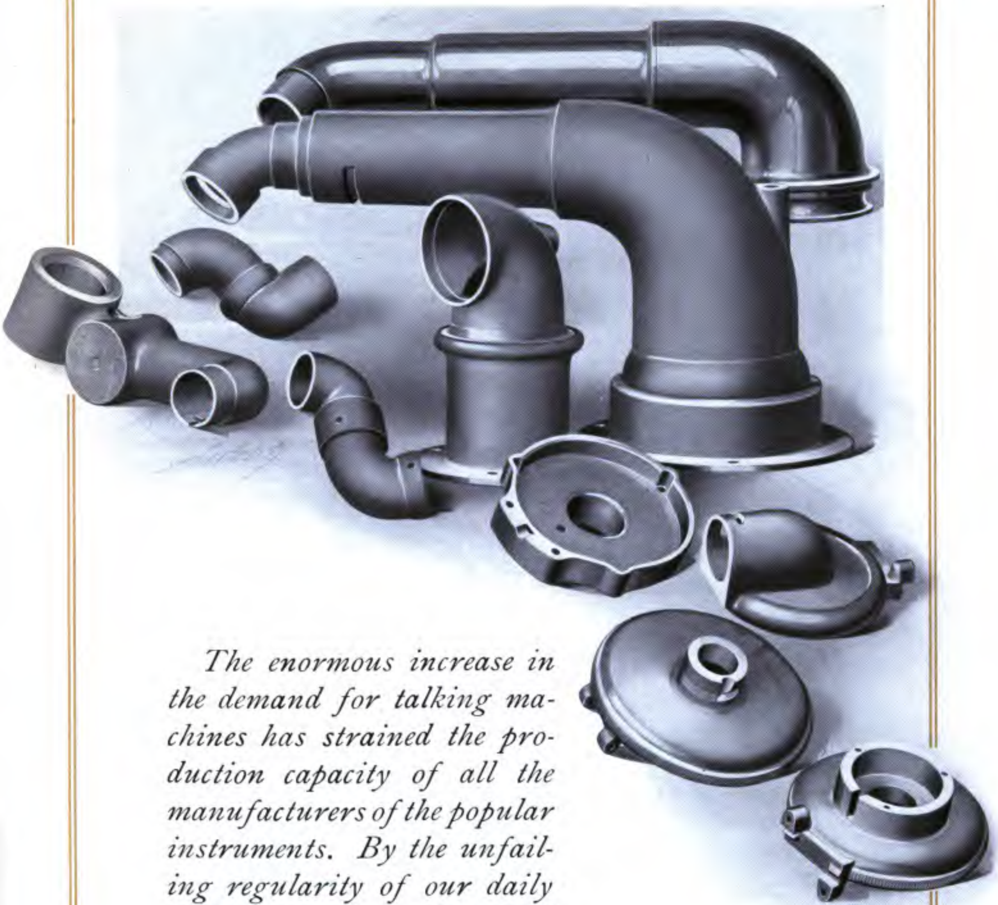
2. Carburetor Cover

Electric
Organ
Parts



Illustrations 1 and 2 represent the Doehler die-cast parts of a well-known Player Piano, the manufacturer of which we quote:

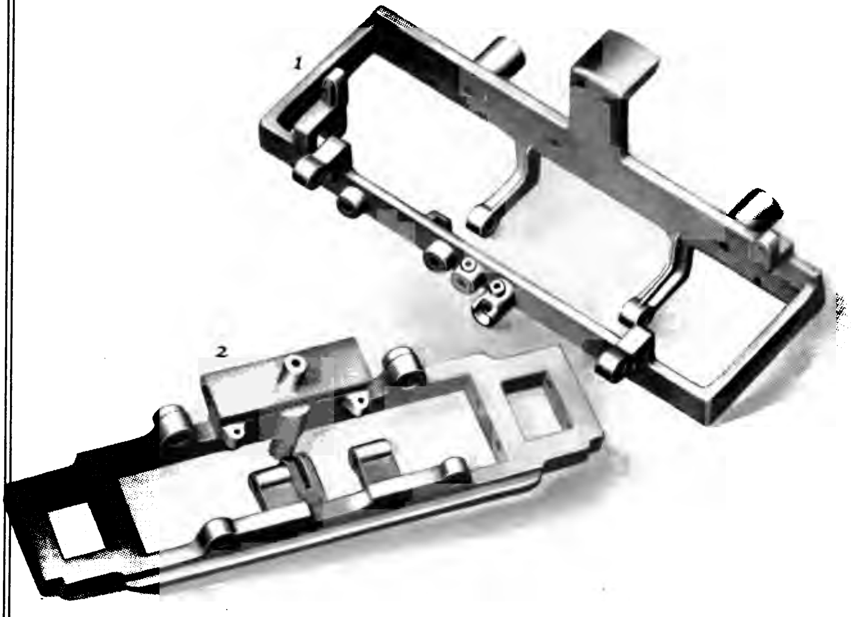
"Without die-castings the commercial success of our product would have been an impossibility. In an article where accuracy, uniformity and dependability are so essential, your die-castings fully meet all requirements."



The enormous increase in the demand for talking machines has strained the production capacity of all the manufacturers of the popular instruments. By the unfailing regularity of our daily deliveries of 2000 sets of parts, during the year 1916, "Doehler Service" was of material assistance to one of the leading manufacturers in the trade.

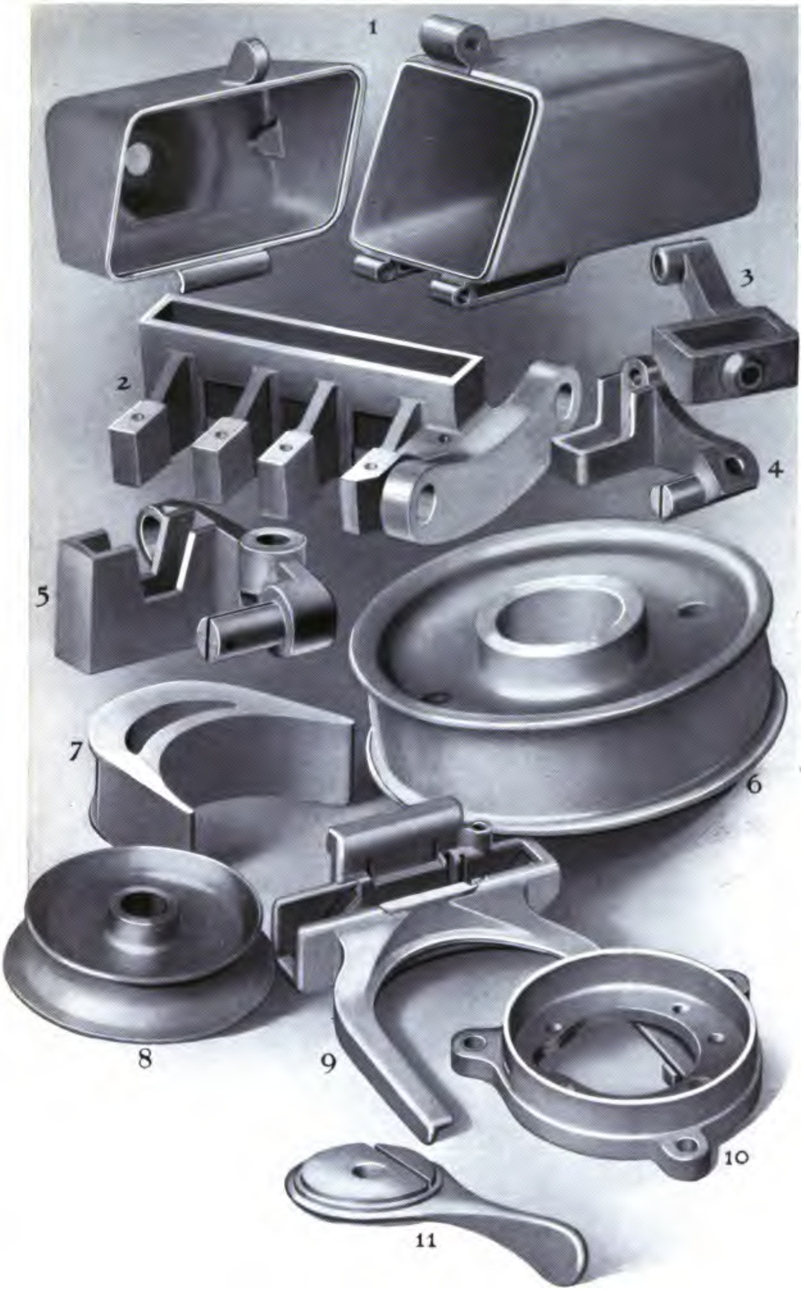
Other talking machine makers secured the same dependable service on proportionate deliveries.

Coin Changing
Device



1. Player
Piano
Winding
Attachment

2. Stenotype
Frame



1. Electric Mine Lamp Case and Cover

2. Brush Holder

3. Brush Holder

4. Brush Holder

5. Brush Holder

6. Automobile Fan Pulley

7. Door Check

8. Motorcycle Pulley

9. Camera Frame

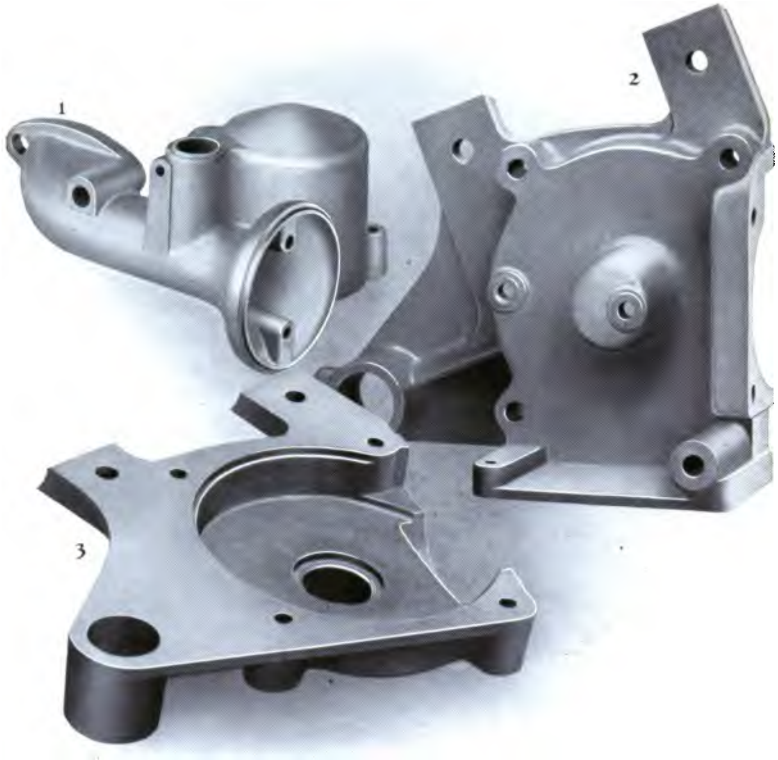
10. Magneto Distributor Base

11. Motorcycle Throttle Lever

1. **Carburetor Body**

2. **Motorcycle Crank Case Part**

3. **Motorcycle Crank Case Part**

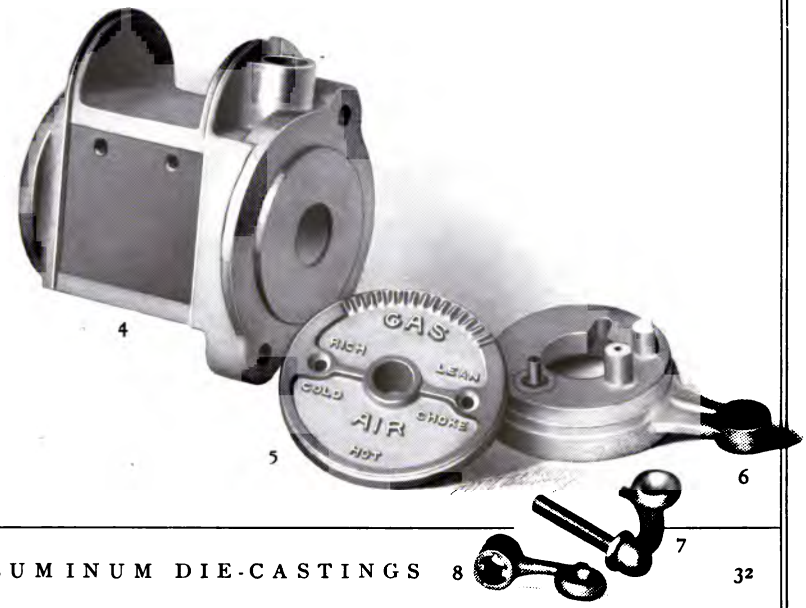


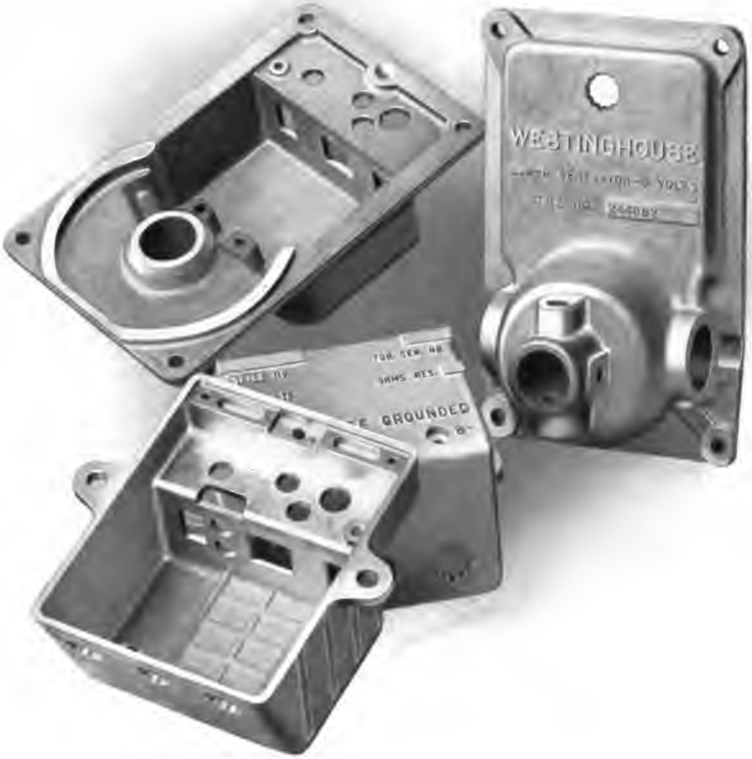
4. **Magneto Housing**

5. **Carburetor Throttle Plate**

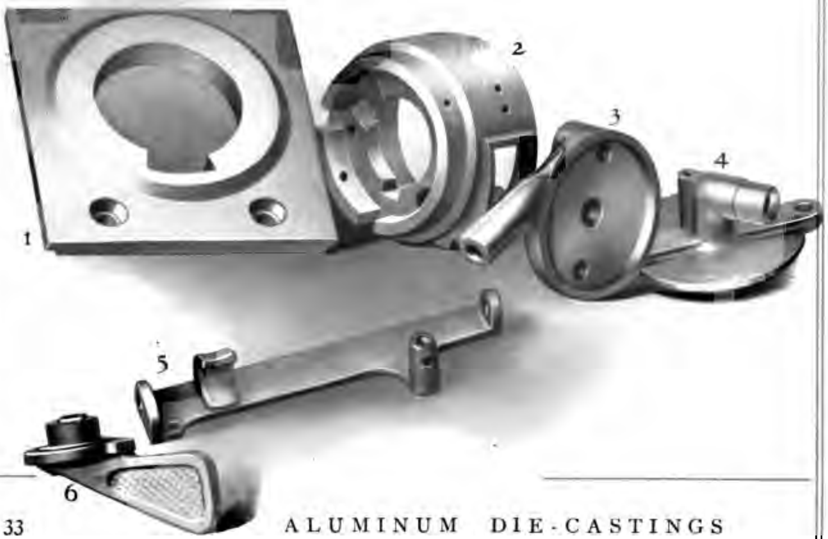
6. **Magneto Breaker Box**

7, 8. **Carburetor Throttle Lever**



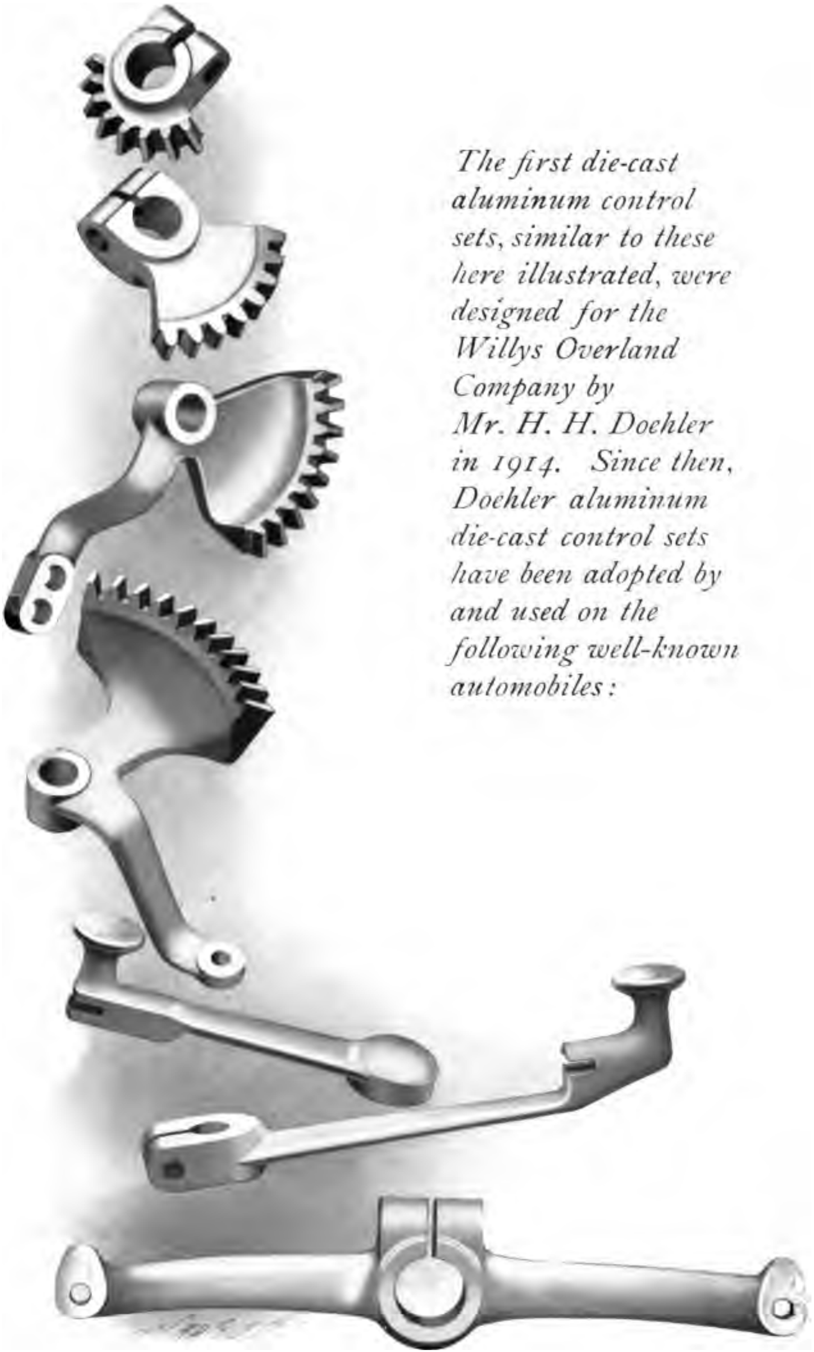


Starting and
Lighting
System
Brackets

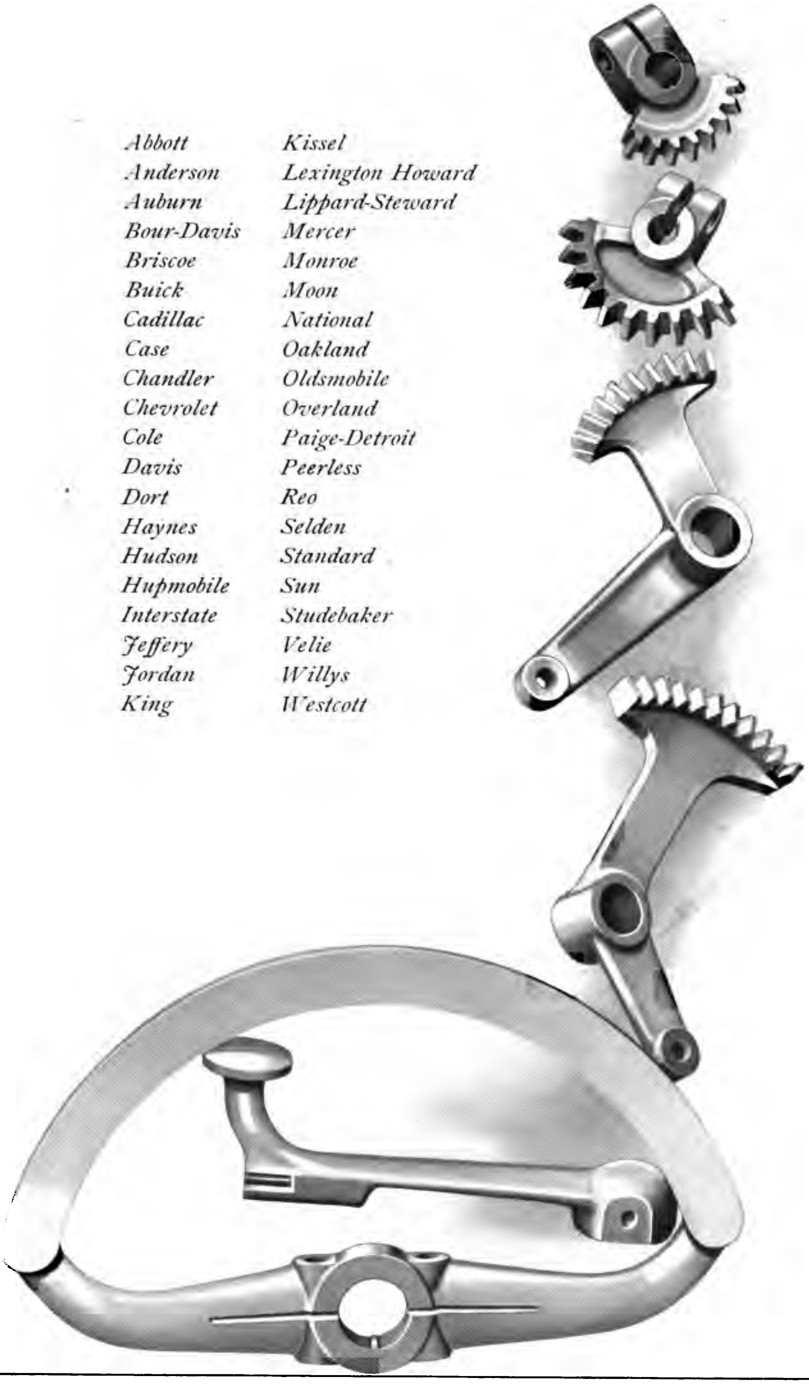


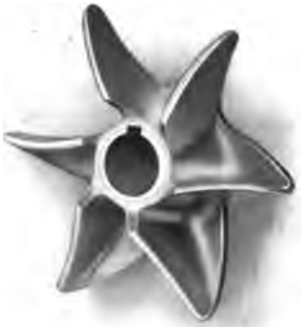
1. Magneto End Plate
2. Magneto Breaker Box
3. Carburetor Float Chamber Cover
4. Motorcycle Throttle
5. Adding Machine Part
6. Magneto Switch Lever

The first die-cast aluminum control sets, similar to these here illustrated, were designed for the Willys Overland Company by Mr. H. H. Doehler in 1914. Since then, Doehler aluminum die-cast control sets have been adopted by and used on the following well-known automobiles:



Abbott
Anderson
Auburn
Bour-Davis
Briscoe
Buick
Cadillac
Case
Chandler
Chevrolet
Cole
Davis
Dort
Haynes
Hudson
Hupmobile
Interstate
Jeffery
Jordan
King
Kissel
Lexington Howard
Lippard-Steward
Mercer
Monroe
Moon
National
Oakland
Oldsmobile
Overland
Paige-Detroit
Peerless
Reo
Selden
Standard
Sun
Studebaker
Velie
Willys
Westcott





Aluminum Die-Cast Water Pump Impeller

FACTORIES
BEHIND THE
DOEHLER PRODUCT

Corner of one of our Cleaning Rooms

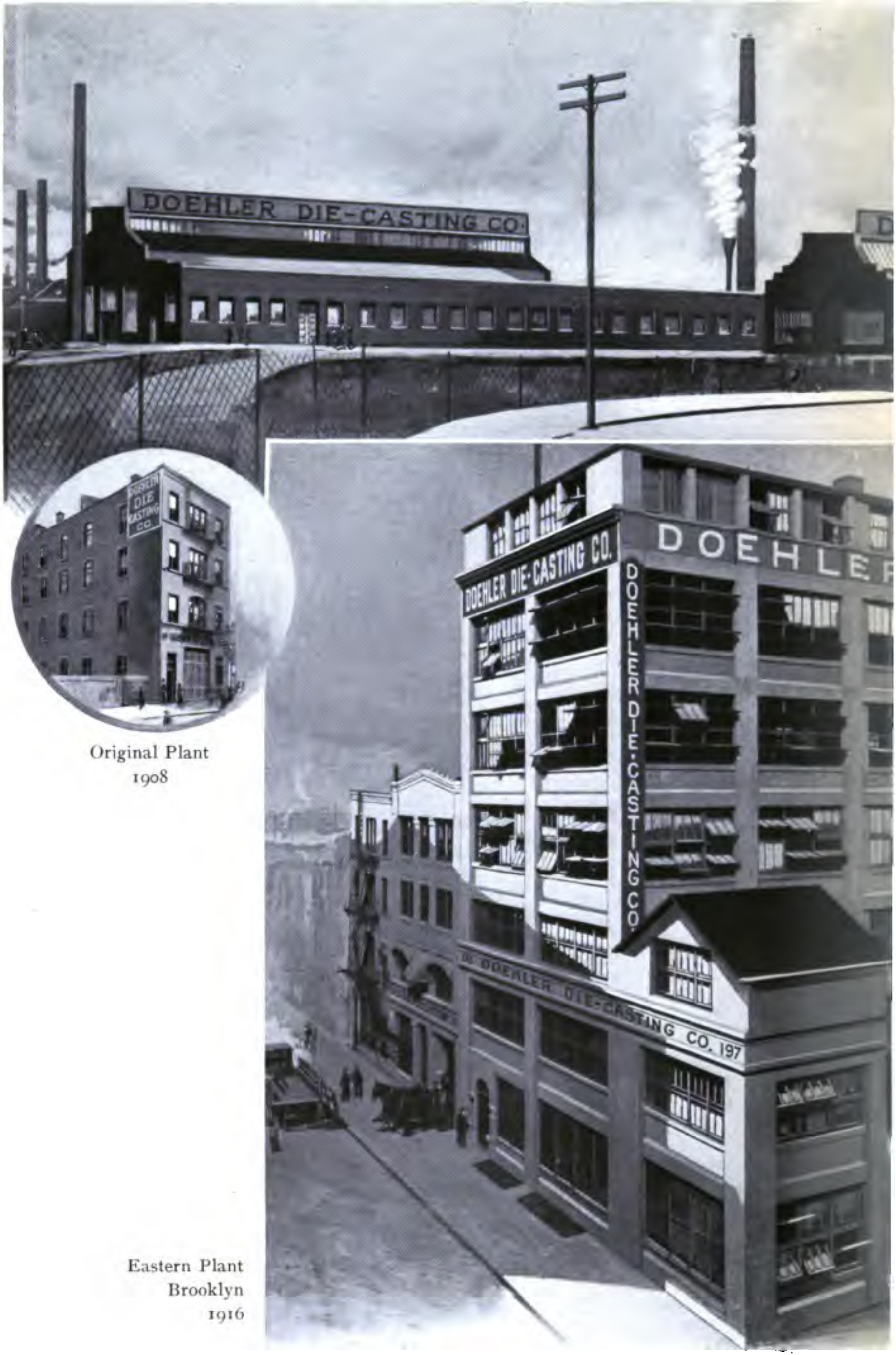
Our " First Aid " Room

One of our Metal Mixing Rooms

View of one of our Die-Making Departments

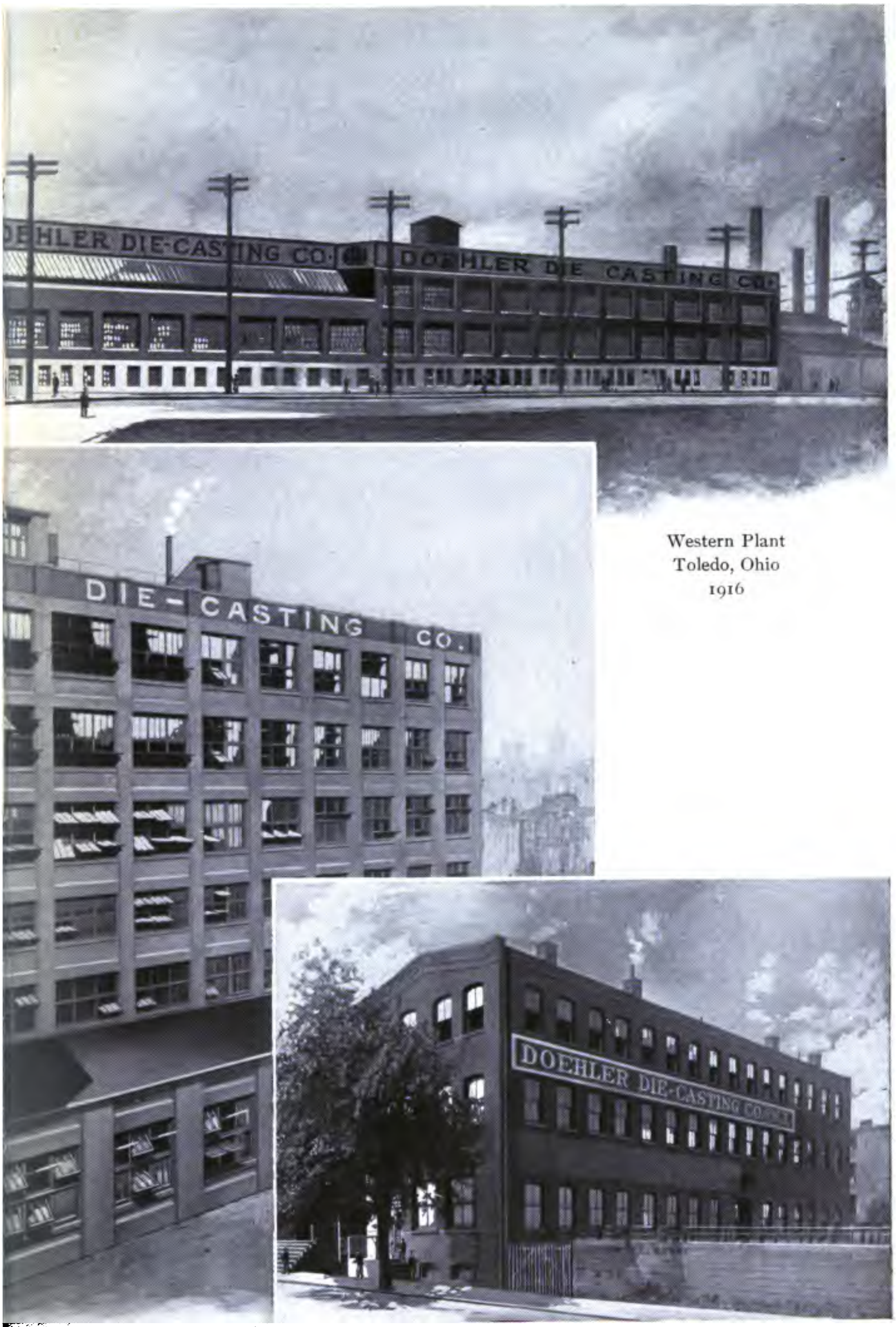
Corner of our Employees Restaurant

A Corner of one of our Stockrooms


DOEHLER DIE-CASTING CO.
DOEHLER DIE CASTING CO.
DOEHLER DIE-CASTING CO.
DOEHLER
DOEHLER DIE-CASTING CO
DOEHLER DIE-CASTING CO. 197

Original Plant
1908

Eastern Plant
Brooklyn
1916


DOEHLER DIE-CASTING CO.
DOEHLER DIE CASTING CO.
DIE-CASTING CO.
DOEHLER DIE-CASTING CO.

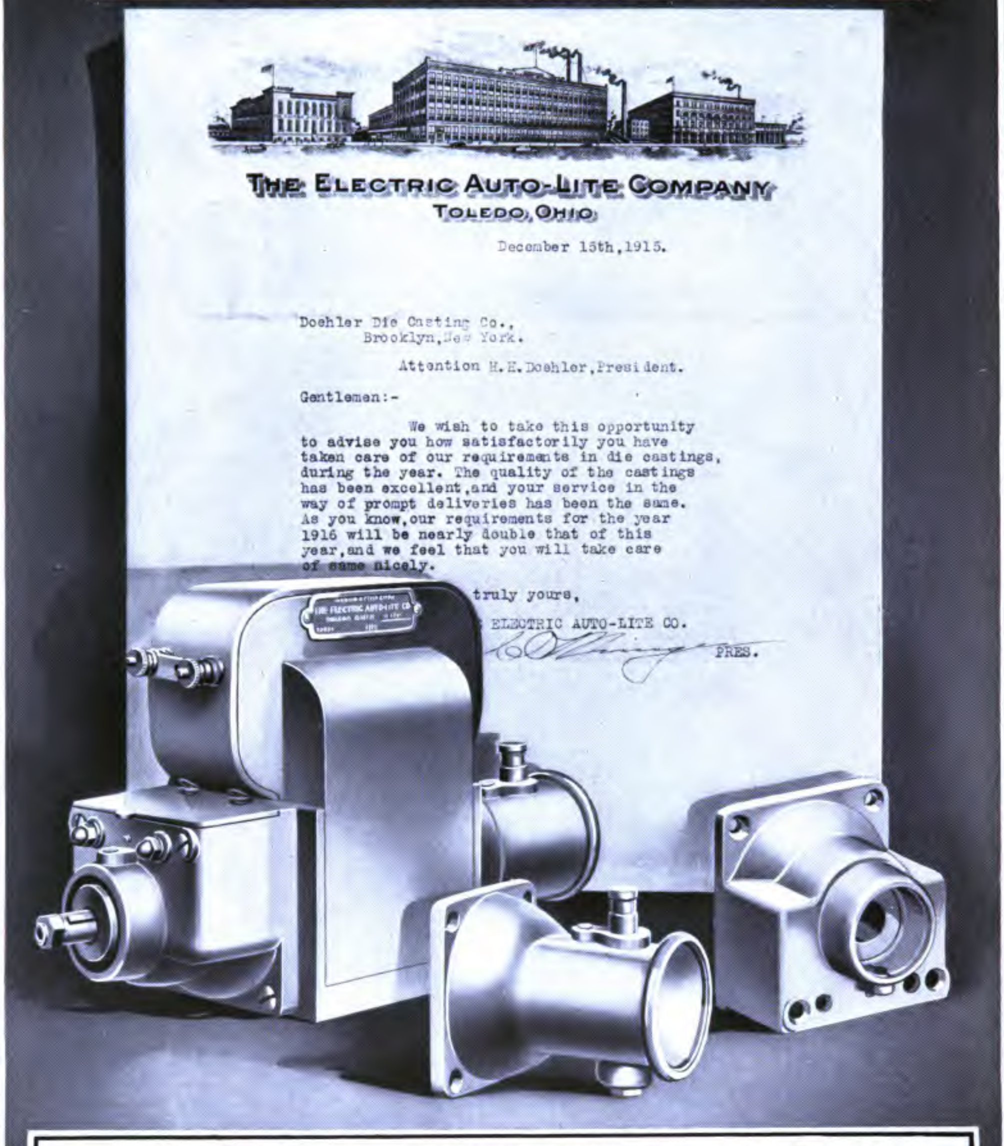
Western Plant
Toledo, Ohio
1916

Newark Plant, Newark, N. J.

A corner of our Chemical Laboratory

and our proudest achievement
is satisfied customers —
as represented by the
following pages

Another Tribute to "Doehler" Quality and Service.



THE ELECTRIC AUTO-LITE COMPANY
TOLEDO, OHIO

December 15th, 1915.

Doehler Die Casting Co.,
Brooklyn, New York.

Attention H. E. Doehler, President.

Gentlemen:-

We wish to take this opportunity to advise you how satisfactorily you have taken care of our requirements in die castings, during the year. The quality of the castings has been excellent, and your service in the way of prompt deliveries has been the same. As you know, our requirements for the year 1916 will be nearly double that of this year, and we feel that you will take care of same nicely.

truly yours,

ELECTRIC AUTO-LITE CO.

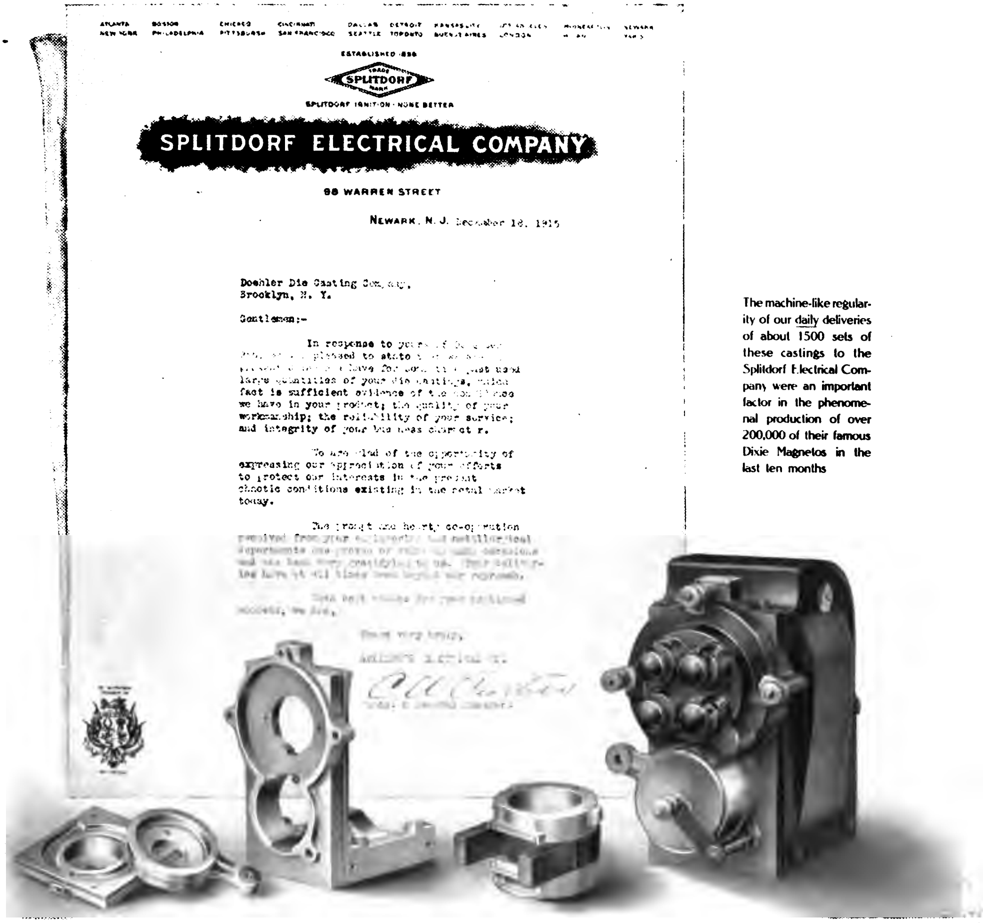
PRES.

DOEHLER DIE-CASTING CO.

BROOKLYN, N.Y. TOLEDO, OHIO.

The Splitdorf Electrical Co.

ON DOEHLER DIE-CASTINGS



ATLANTA BOSTON CHICAGO CINCINNATI DALLAS DETROIT KANSAS CITY LOS ANGELES MINNEAPOLIS NEWARK
NEW YORK PHILADELPHIA PITTSBURGH SAN FRANCISCO SEATTLE TORONTO BUENOS AIRES LONDON MILAN PARIS

ESTABLISHED [illegible]

TRADE SPLITDORF MARK

SPLITDORF IGNITION · NONE BETTER

SPLITDORF ELECTRICAL COMPANY

98 WARREN STREET

NEWARK, N. J. December 18, 1915

Doehler Die Casting Company,
Brooklyn, N. Y.

Gentlemen:-

In response to yours [illegible] pleased to state [illegible] have for [illegible] past used large quantities of your die castings, which fact is sufficient evidence of the confidence we have in your product; the quality of your workmanship; the reliability of your service; and integrity of your business character.

We are glad of the opportunity of expressing our appreciation of your efforts to protect our interests in the present chaotic conditions existing in the metal market today.

The prompt and hearty co-operation [illegible]

Yours very truly,

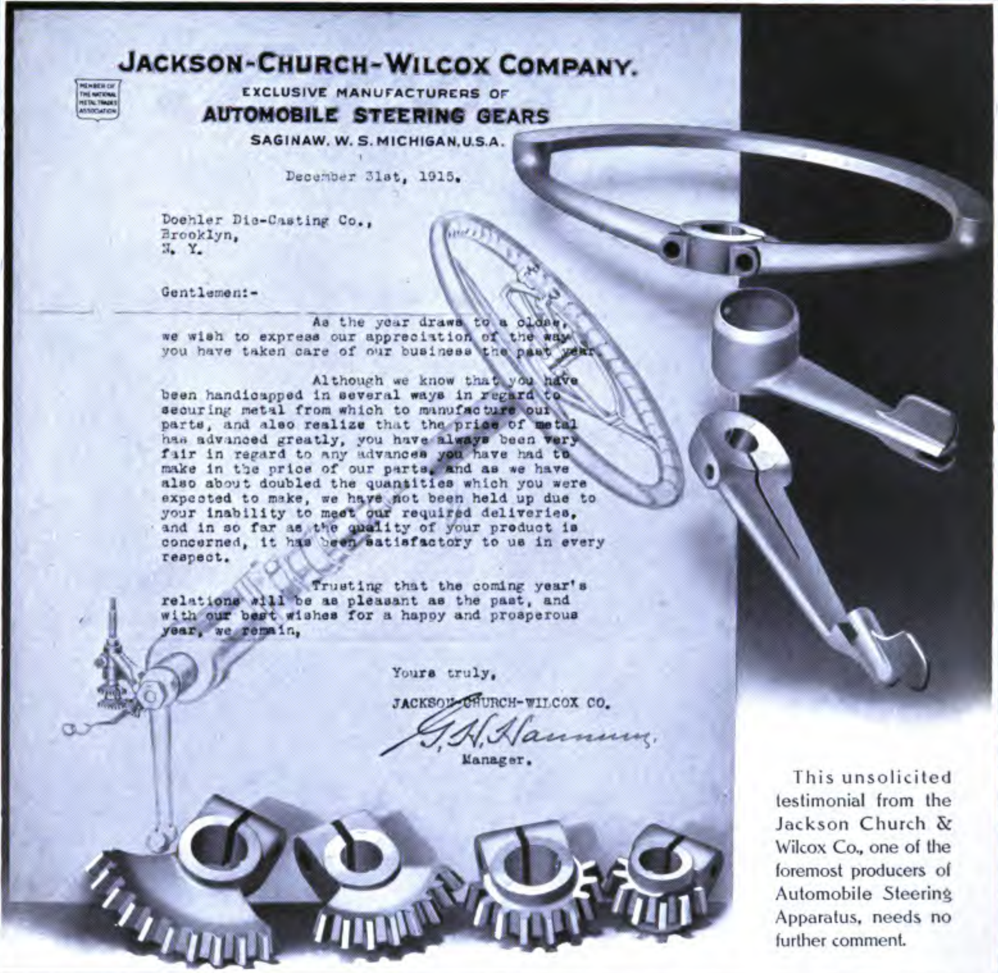
The machine-like regularity of our daily deliveries of about 1500 sets of these castings to the Splitdorf Electrical Company were an important factor in the phenomenal production of over 200,000 of their famous Dixie Magnetos in the last ten months

DOEHLER DIE-CASTING CO.

BROOKLYN. N.Y.
TOLEDO. OHIO.

DOEHLER DIE-CASTINGS

- AUTOMOBILE STEERING PARTS IN ALUMINUM -



MEMBER OF THE NATIONAL METAL TRADES ASSOCIATION

JACKSON-CHURCH-WILCOX COMPANY.

EXCLUSIVE MANUFACTURERS OF
AUTOMOBILE STEERING GEARS
SAGINAW, W. S. MICHIGAN, U.S.A.

December 31st, 1915.

Doehler Die-Casting Co.,
Brooklyn,
N. Y.

Gentlemen:-

As the year draws to a close, we wish to express our appreciation of the way you have taken care of our business the past year.

Although we know that you have been handicapped in several ways in regard to securing metal from which to manufacture our parts, and also realize that the price of metal has advanced greatly, you have always been very fair in regard to any advances you have had to make in the price of our parts, and as we have also about doubled the quantities which you were expected to make, we have not been held up due to your inability to meet our required deliveries, and in so far as the quality of your product is concerned, it has been satisfactory to us in every respect.

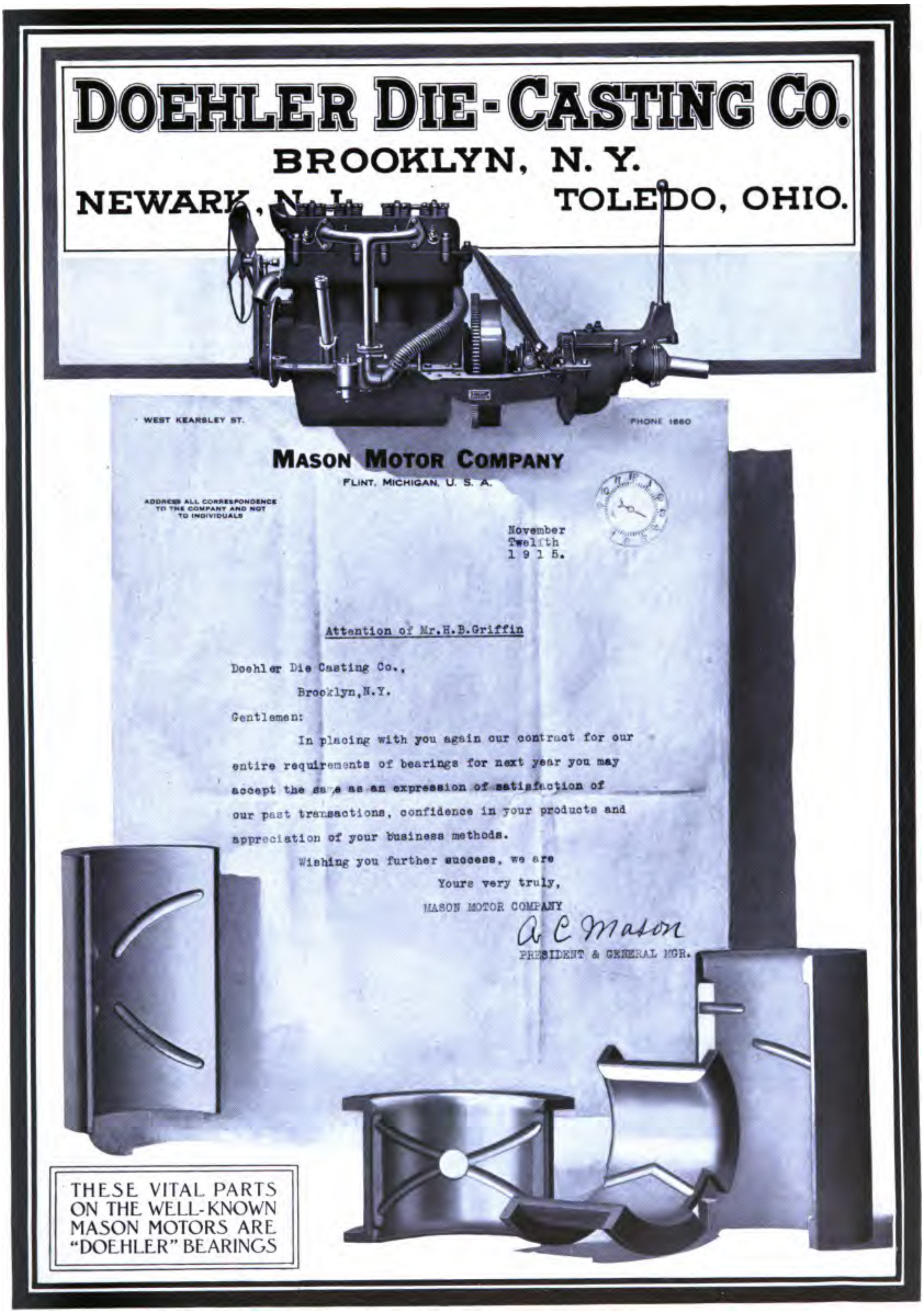
Trusting that the coming year's relations will be as pleasant as the past, and with our best wishes for a happy and prosperous year, we remain,

Yours truly,
JACKSON-CHURCH-WILCOX CO.
G. H. Hannum.
Manager.

This unsolicited testimonial from the Jackson Church & Wilcox Co., one of the foremost producers of Automobile Steering Apparatus, needs no further comment.

DOEHLER DIE-CASTING CO.

BROOKLYN. N.Y.
TOLEDO. OHIO.



DOEHLER DIE-CASTING CO.

BROOKLYN, N. Y.

NEWARK, N. J. TOLEDO, OHIO.

WEST KEARSLEY ST. PHONE 1660

MASON MOTOR COMPANY
FLINT, MICHIGAN, U. S. A.

ADDRESS ALL CORRESPONDENCE
TO THE COMPANY AND NOT
TO INDIVIDUALS

November
Twelfth
1 9 1 5.

Attention of Mr.H.B.Griffin

Doehler Die Casting Co.,
Brooklyn,N.Y.

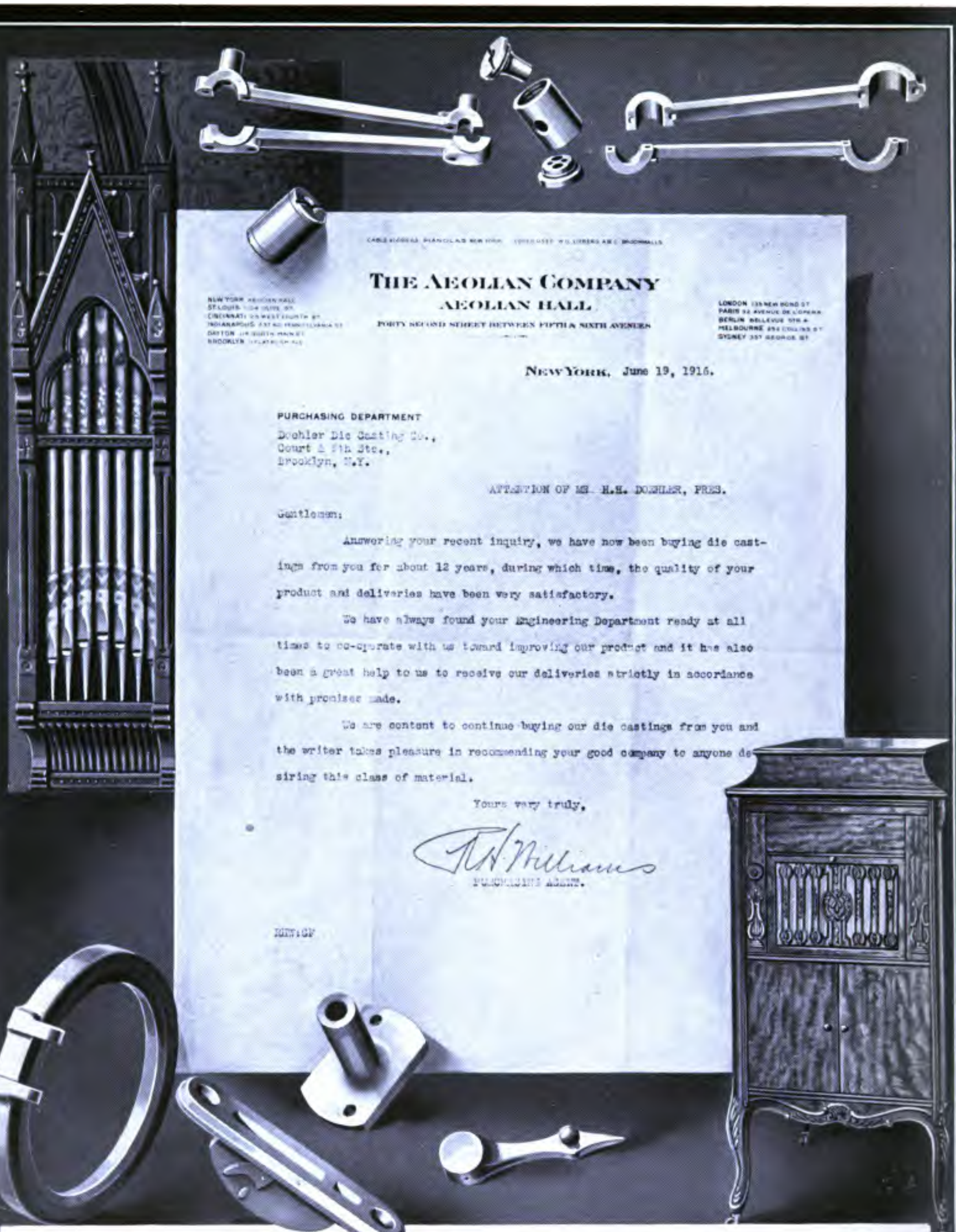
Gentlemen:

In placing with you again our contract for our entire requirements of bearings for next year you may accept the same as an expression of satisfaction of our past transactions, confidence in your products and appreciation of your business methods.

Wishing you further success, we are

Yours very truly,
MASON MOTOR COMPANY
A C Mason
PRESIDENT & GENERAL MGR.

THESE VITAL PARTS
ON THE WELL-KNOWN
MASON MOTORS ARE
"DOEHLER" BEARINGS



CABLE ADDRESS: PIANOLAS NEW YORK   CODES USED: W.U. LIEBERS A.B.C. BROOMHALLS

THE AEOLIAN COMPANY

AEOLIAN HALL

FORTY SECOND STREET BETWEEN FIFTH & SIXTH AVENUES

NEW YORK AEOLIAN HALL
ST. LOUIS [illegible]
CINCINNATI [illegible]
INDIANAPOLIS [illegible]
DAYTON [illegible]
BROOKLYN [illegible]

LONDON 135 NEW BOND ST
PARIS 32 AVENUE DE L'OPERA
BERLIN BELLEVUE STR 4
MELBOURNE 254 COLLINS ST
SYDNEY 337 GEORGE ST

NEW YORK, June 19, 1916.

PURCHASING DEPARTMENT

Doehler Die Casting Co.,
Court & 9th Sts.,
Brooklyn, N.Y.

ATTENTION OF MR. H.H. DOEHLER, PRES.

Gentlemen:

Answering your recent inquiry, we have now been buying die castings from you for about 12 years, during which time, the quality of your product and deliveries have been very satisfactory.

We have always found your Engineering Department ready at all times to co-operate with us toward improving our product and it has also been a great help to us to receive our deliveries strictly in accordance with promises made.

We are content to continue buying our die castings from you and the writer takes pleasure in recommending your good company to anyone desiring this class of material.

Yours very truly,

R.H. Williams
PURCHASING AGENT.

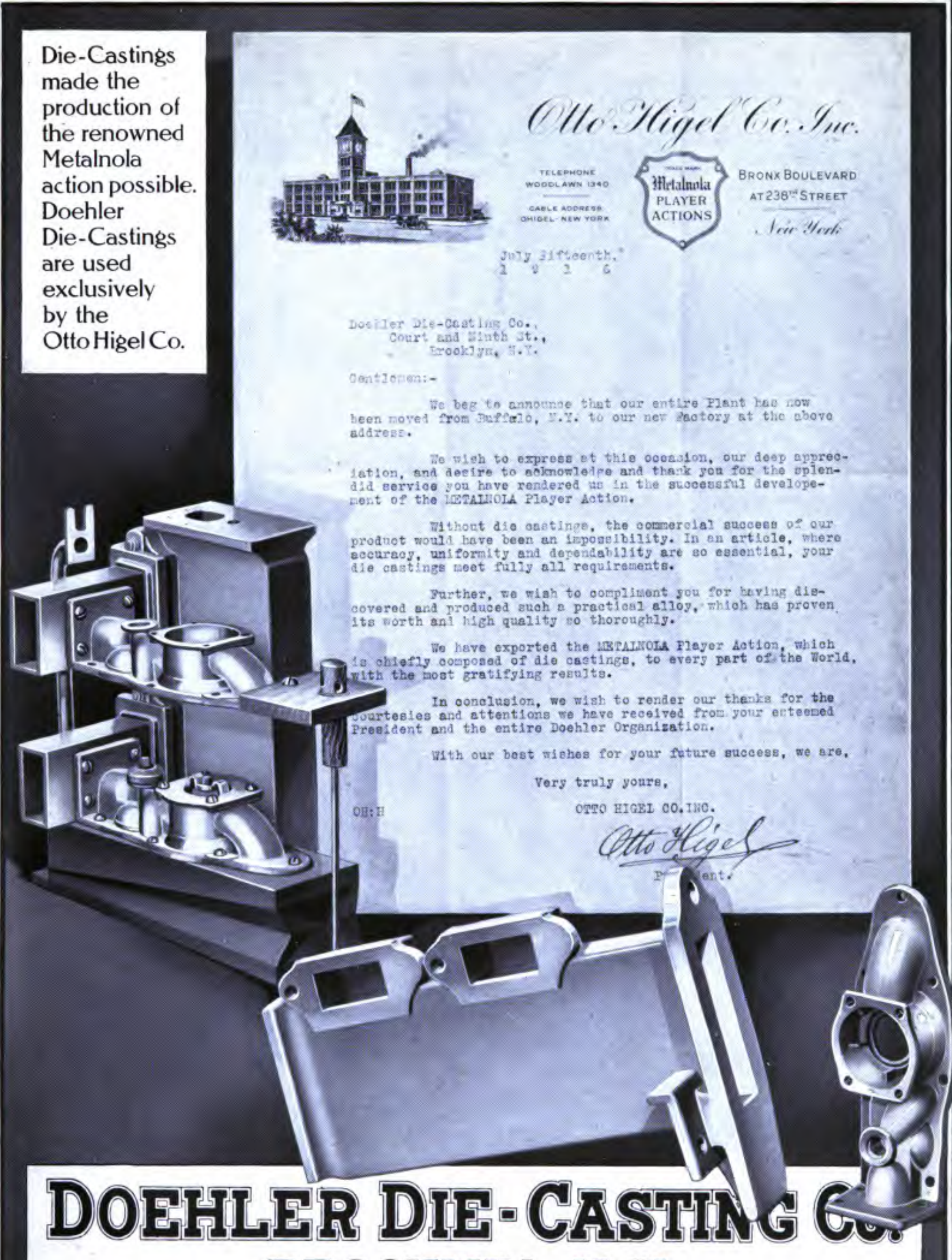
RHW:GF

DOEHLER DIE-CASTING CO.

BROOKLYN, N. Y.

NEWARK, N.J.   TOLEDO, OHIO.

Die-Castings
made the
production of
the renowned
Metalnola
action possible.
Doehler
Die-Castings
are used
exclusively
by the
Otto Higel Co.



Otto Higel Co. Inc.

TELEPHONE
WOODLAWN 1340

CABLE ADDRESS
OHIGEL-NEW YORK

TRADE MARK
Metalnola
PLAYER
ACTIONS

BRONX BOULEVARD
AT 238TH STREET
New York

July Fifteenth,
1 9 1 6

Doehler Die-Casting Co.,
Court and Ninth St.,
Brooklyn, N.Y.

Gentlemen:-

We beg to announce that our entire Plant has now been moved from Buffalo, N.Y. to our new Factory at the above address.

We wish to express at this occasion, our deep appreciation, and desire to acknowledge and thank you for the splendid service you have rendered us in the successful developement of the METALNOLA Player Action.

Without die castings, the commercial success of our product would have been an impossibility. In an article, where accuracy, uniformity and dependability are so essential, your die castings meet fully all requirements.

Further, we wish to compliment you for having discovered and produced such a practical alloy, which has proven its worth and high quality so thoroughly.

We have exported the METALNOLA Player Action, which is chiefly composed of die castings, to every part of the World, with the most gratifying results.

In conclusion, we wish to render our thanks for the courtesies and attentions we have received from your esteemed President and the entire Doehler Organization.

With our best wishes for your future success, we are,

Very truly yours,

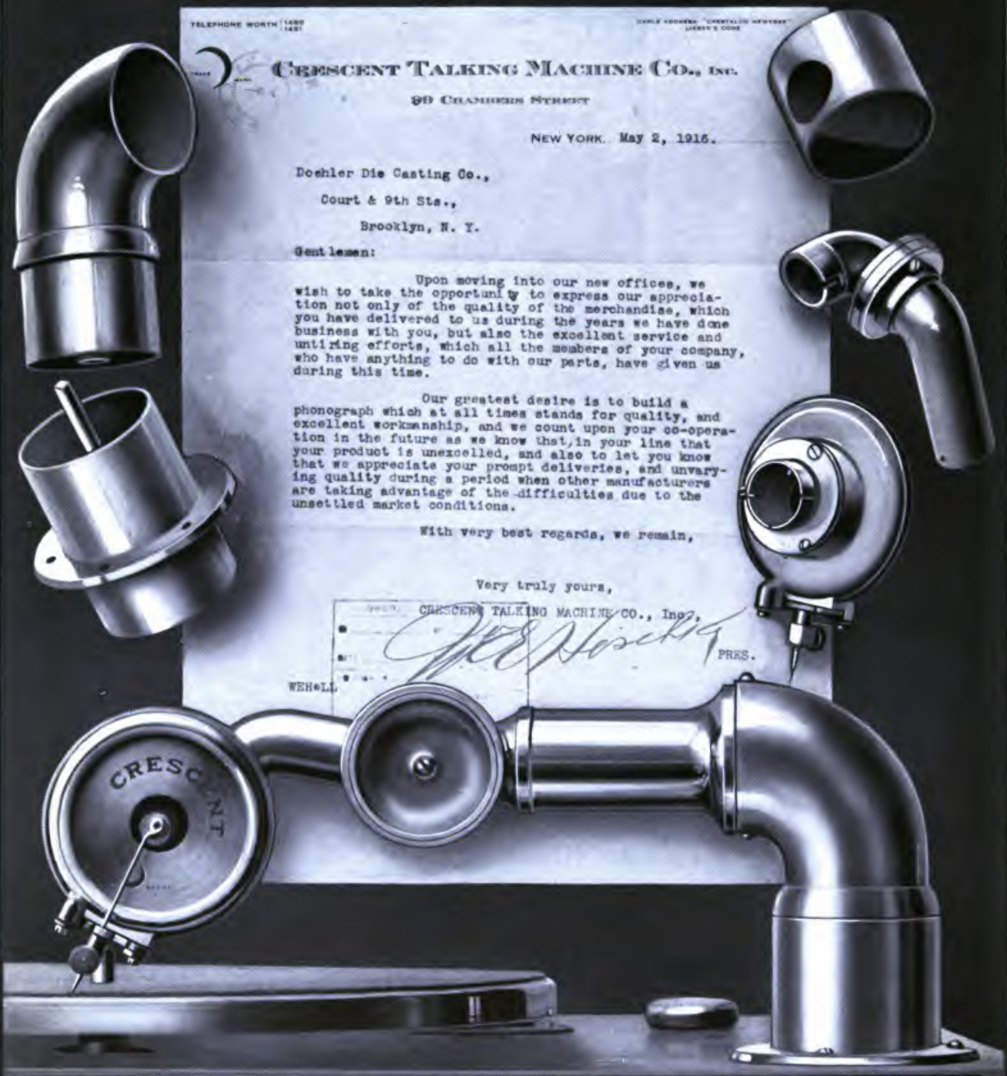
OH:H

OTTO HIGEL CO. INC.
Otto Higel
P ent.

DOEHLER DIE-CASTING CO.

BROOKLYN, N. Y.
NEWARK, N. J. TOLEDO, OHIO.

OUR BEST ADVERTISEMENT—SATISFIED CUSTOMERS



TELEPHONE WORTH 1480
1481

CRESCENT TALKING MACHINE CO., INC.
99 CHAMBERS STREET

NEW YORK. May 2, 1916.

Doehler Die Casting Co.,
Court & 9th Sts.,
Brooklyn, N. Y.

Gentlemen:

Upon moving into our new offices, we wish to take the opportunity to express our appreciation not only of the quality of the merchandise, which you have delivered to us during the years we have done business with you, but also the excellent service and untiring efforts, which all the members of your company, who have anything to do with our parts, have given us during this time.

Our greatest desire is to build a phonograph which at all times stands for quality, and excellent workmanship, and we count upon your co-operation in the future as we know that, in your line that your product is unexcelled, and also to let you know that we appreciate your prompt deliveries, and unvarying quality during a period when other manufacturers are taking advantage of the difficulties due to the unsettled market conditions.

With very best regards, we remain,

Very truly yours,

CRESCENT TALKING MACHINE CO., Inc.

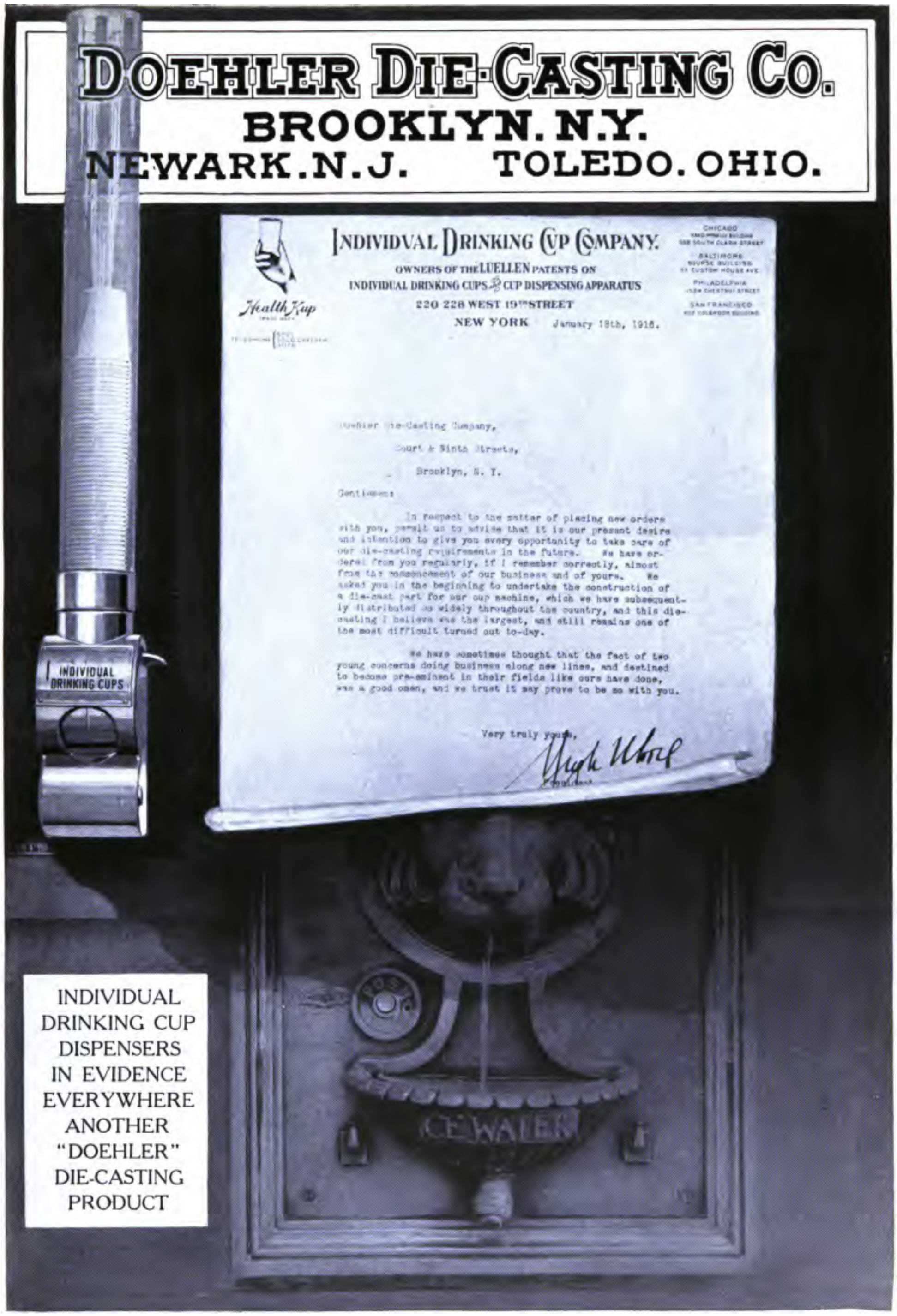
PRES.

WEH•LL

DOEHLER DIE-CASTING CO.

BROOKLYN, N. Y.

NEWARK, N. J. TOLEDO, OHIO.



DOEHLER DIE-CASTING CO.

BROOKLYN. N.Y.

NEWARK.N.J. TOLEDO.OHIO.

INDIVIDVAL DRINKING CVP COMPANY.
OWNERS OF THE LUELLEN PATENTS ON
INDIVIDUAL DRINKING CUPS & CUP DISPENSING APPARATUS
220 228 WEST 19TH STREET
NEW YORK

Health Kup
TRADE MARK

CHICAGO
538 SOUTH CLARK STREET
BALTIMORE
BOURSE BUILDING
37 CUSTOM HOUSE AVE
PHILADELPHIA
1524 CHESTNUT STREET
SAN FRANCISCO

January 18th, 1916.

Doehler Die-Casting Company,
Court & Ninth Streets,
Brooklyn, N. Y.

Gentlemen:

In respect to the matter of placing new orders with you, permit us to advise that it is our present desire and intention to give you every opportunity to take care of our die-casting requirements in the future. We have ordered from you regularly, if I remember correctly, almost from the commencement of our business and of yours. We asked you in the beginning to undertake the construction of a die-cast part for our cup machine, which we have subsequently distributed so widely throughout the country, and this die-casting I believe was the largest, and still remains one of the most difficult turned out to-day.

We have sometimes thought that the fact of two young concerns doing business along new lines, and destined to become pre-eminent in their fields like ours have done, was a good omen, and we trust it may prove to be so with you.

Very truly yours,

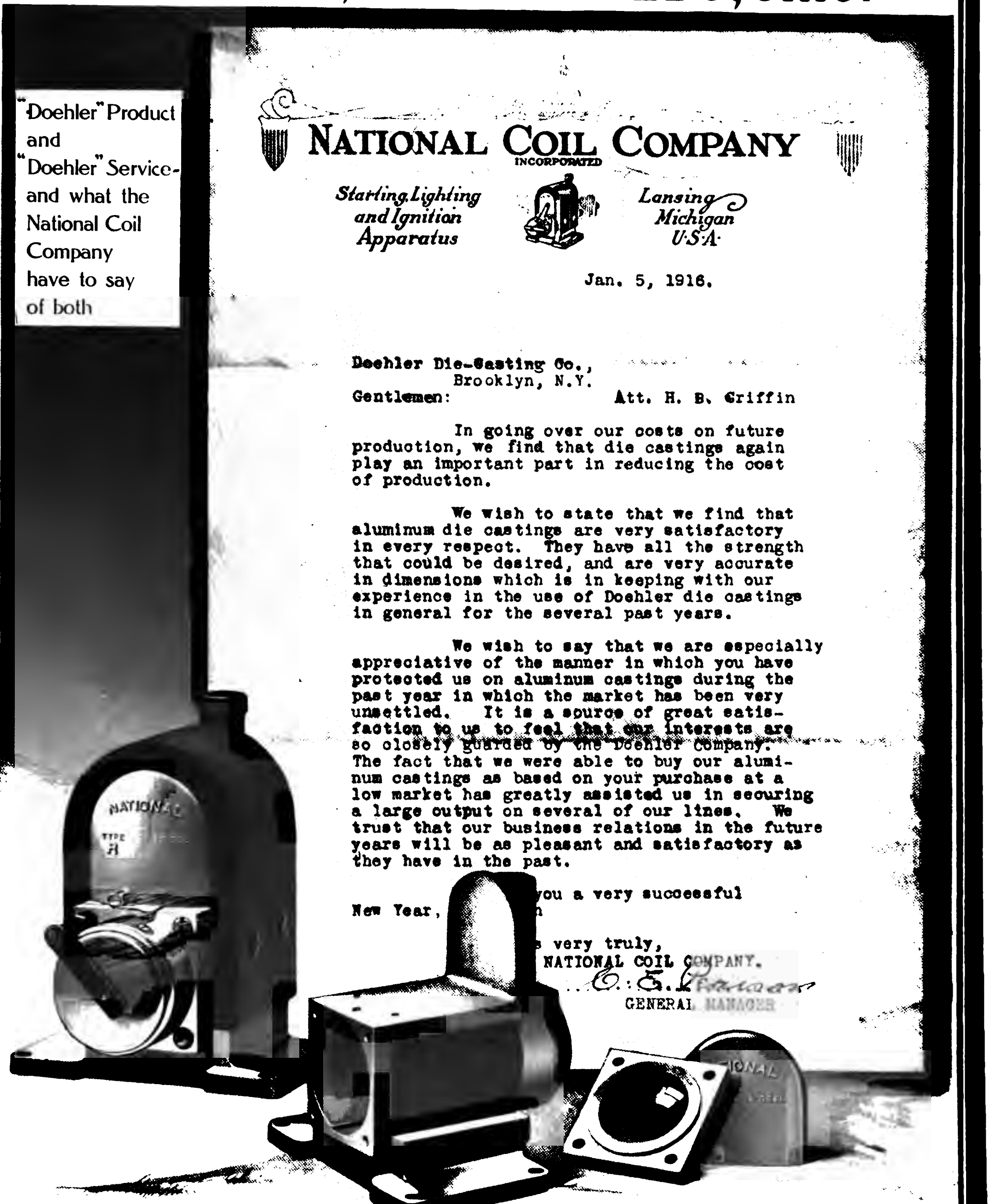
Hugh Moore
President

INDIVIDUAL DRINKING CUPS
ICE WATER
INDIVIDUAL DRINKING CUP DISPENSERS IN EVIDENCE EVERYWHERE ANOTHER "DOEHLER" DIE-CASTING PRODUCT

DOEHLER DIE-CASTING CO.

BROOKLYN, N.Y. **TOLEDO, OHIO.**

"Doehler" Product
and
"Doehler" Service-
and what the
National Coil
Company
have to say
of both



NATIONAL COIL COMPANY
INCORPORATED

Starting, Lighting and Ignition Apparatus

Lansing Michigan U.S.A.

Jan. 5, 1916.

Doehler Die-Casting Co.,
Brooklyn, N.Y.
Gentlemen: Att. H. B. Griffin

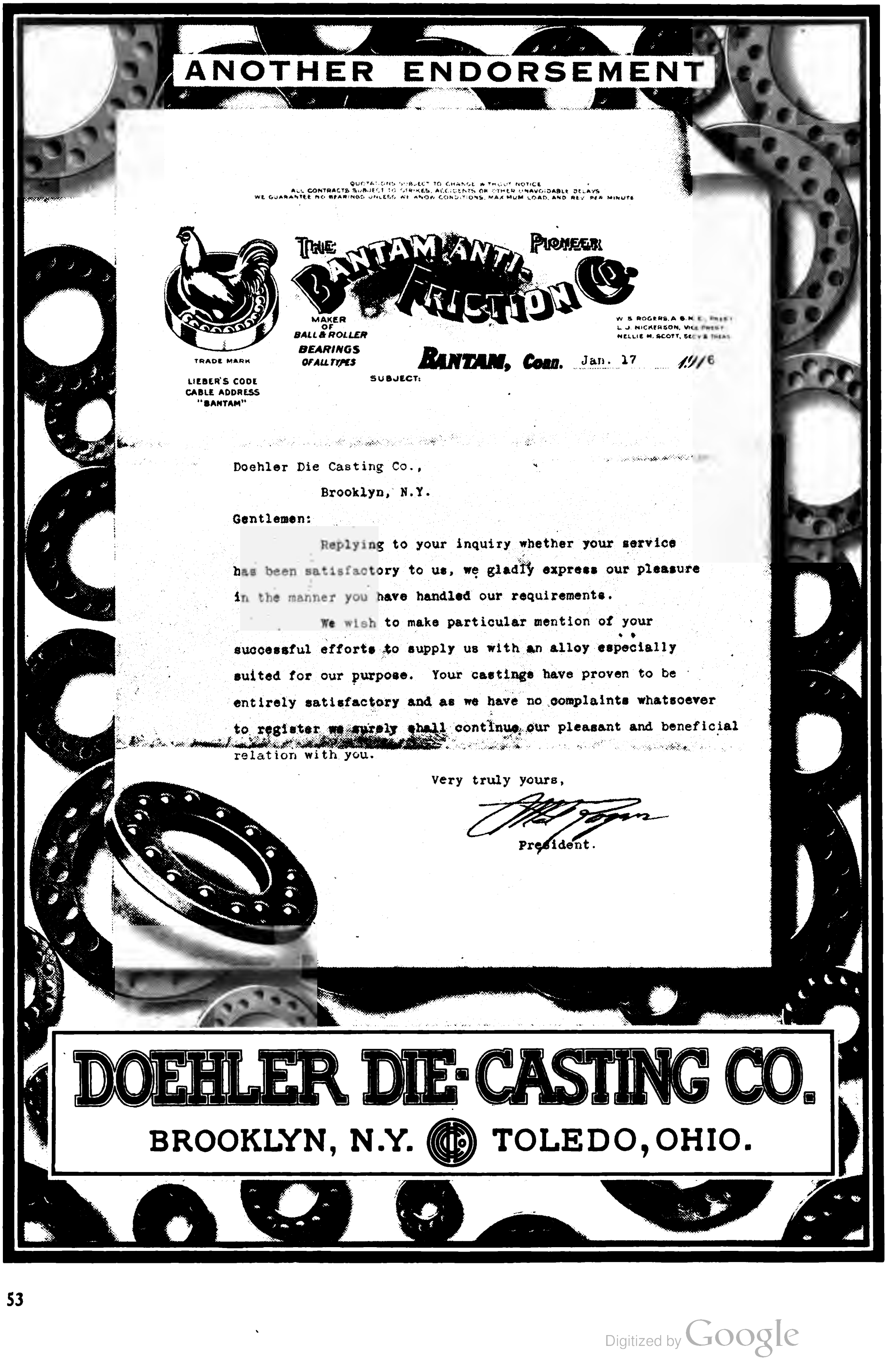
In going over our costs on future production, we find that die castings again play an important part in reducing the cost of production.

We wish to state that we find that aluminum die castings are very satisfactory in every respect. They have all the strength that could be desired, and are very accurate in dimensions which is in keeping with our experience in the use of Doehler die castings in general for the several past years.

We wish to say that we are especially appreciative of the manner in which you have protected us on aluminum castings during the past year in which the market has been very unsettled. It is a source of great satisfaction to us to feel that our interests are so closely guarded by the Doehler Company. The fact that we were able to buy our aluminum castings as based on your purchase at a low market has greatly assisted us in securing a large output on several of our lines. We trust that our business relations in the future years will be as pleasant and satisfactory as they have in the past.

you a very successful
New Year, n

s very truly,
NATIONAL COIL COMPANY.
C. E.
GENERAL MANAGER



ANOTHER ENDORSEMENT

QUOTATIONS SUBJECT TO CHANGE WITHOUT NOTICE
ALL CONTRACTS SUBJECT TO STRIKES, ACCIDENTS OR OTHER UNAVOIDABLE DELAYS
WE GUARANTEE NO BEARINGS UNLESS WE KNOW CONDITIONS, MAXIMUM LOAD, AND REV. PER MINUTE

THE BANTAM ANTI-FRICTION CO.
PIONEER
MAKER OF BALL & ROLLER BEARINGS OF ALL TYPES

TRADE MARK

LIEBER'S CODE
CABLE ADDRESS
"BANTAM"

W. S. ROGERS, A. S. M. E., PRES'T
L. J. NICKERSON, VICE PRES'T
NELLIE M. SCOTT, SEC'Y & TREAS.

BANTAM, Conn. Jan. 17 1916

SUBJECT:

Doehler Die Casting Co.,
Brooklyn, N.Y.

Gentlemen:

Replying to your inquiry whether your service has been satisfactory to us, we gladly express our pleasure in the manner you have handled our requirements.

We wish to make particular mention of your successful efforts to supply us with an alloy especially suited for our purpose. Your castings have proven to be entirely satisfactory and as we have no complaints whatsoever to register we surely shall continue our pleasant and beneficial relation with you.

Very truly yours,

W. S. Rogers

President.

DOEHLER DIE-CASTING CO.

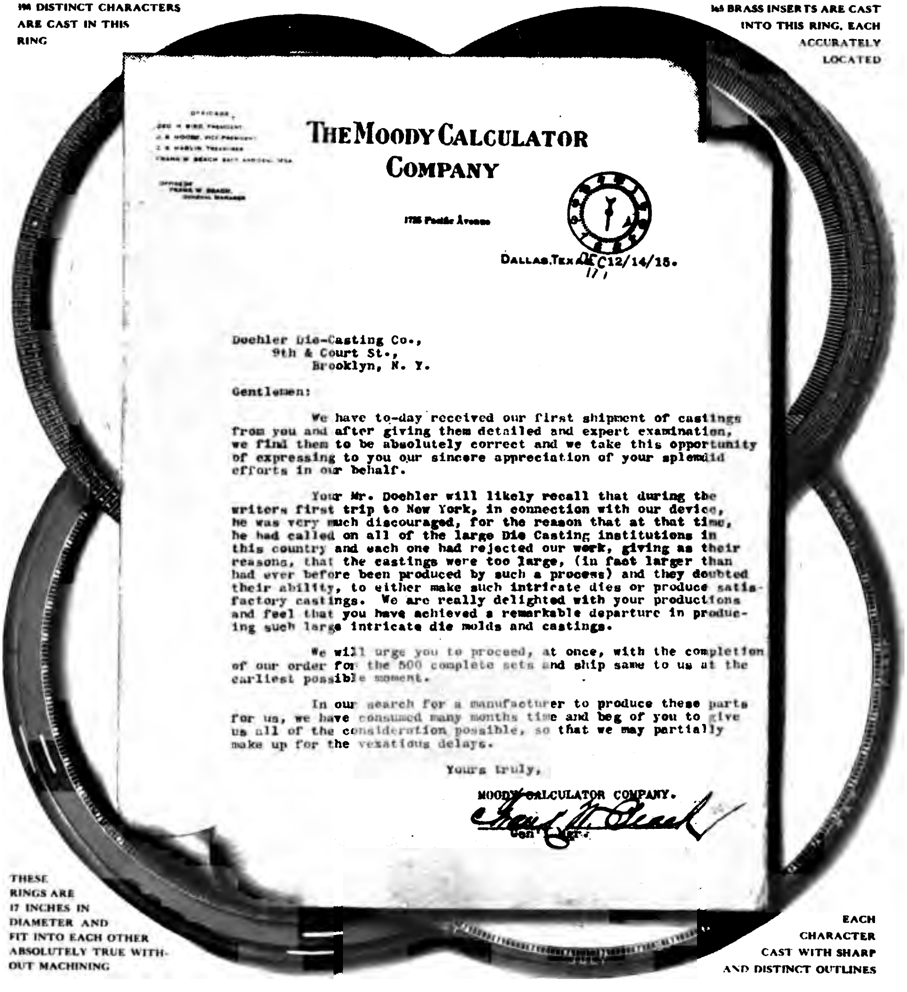
BROOKLYN, N.Y. TOLEDO, OHIO.

A Customer's Tribute to

DOEHLER DIE-CASTINGS

198 DISTINCT CHARACTERS ARE CAST IN THIS RING

165 BRASS INSERTS ARE CAST INTO THIS RING, EACH ACCURATELY LOCATED



THE MOODY CALCULATOR COMPANY

1725 Pacific Avenue

DALLAS, TEX. DEC 12/14/15.
171

Doehler Die-Casting Co.,
9th & Court St.,
Brooklyn, N. Y.

Gentlemen:

We have to-day received our first shipment of castings from you and after giving them detailed and expert examination, we find them to be absolutely correct and we take this opportunity of expressing to you our sincere appreciation of your splendid efforts in our behalf.

Your Mr. Doehler will likely recall that during the writers first trip to New York, in connection with our device, he was very much discouraged, for the reason that at that time, he had called on all of the large Die Casting institutions in this country and each one had rejected our work, giving as their reasons, that the castings were too large, (in fact larger than had ever before been produced by such a process) and they doubted their ability, to either make such intricate dies or produce satisfactory castings. We are really delighted with your productions and feel that you have achieved a remarkable departure in producing such large intricate die molds and castings.

We will urge you to proceed, at once, with the completion of our order for the 500 complete sets and ship same to us at the earliest possible moment.

In our search for a manufacturer to produce these parts for us, we have consumed many months time and beg of you to give us all of the consideration possible, so that we may partially make up for the vexatious delays.

Yours truly,

MOODY CALCULATOR COMPANY.
Frank W. Beach
Gen'l Mgr.

THESE RINGS ARE 17 INCHES IN DIAMETER AND FIT INTO EACH OTHER ABSOLUTELY TRUE WITHOUT MACHINING

EACH CHARACTER CAST WITH SHARP AND DISTINCT OUTLINES

DOEHLER DIE-CASTING CO.

BROOKLYN. N.Y.

TOLEDO. OHIO.

Bartlett Orr Press, New York